School Shop

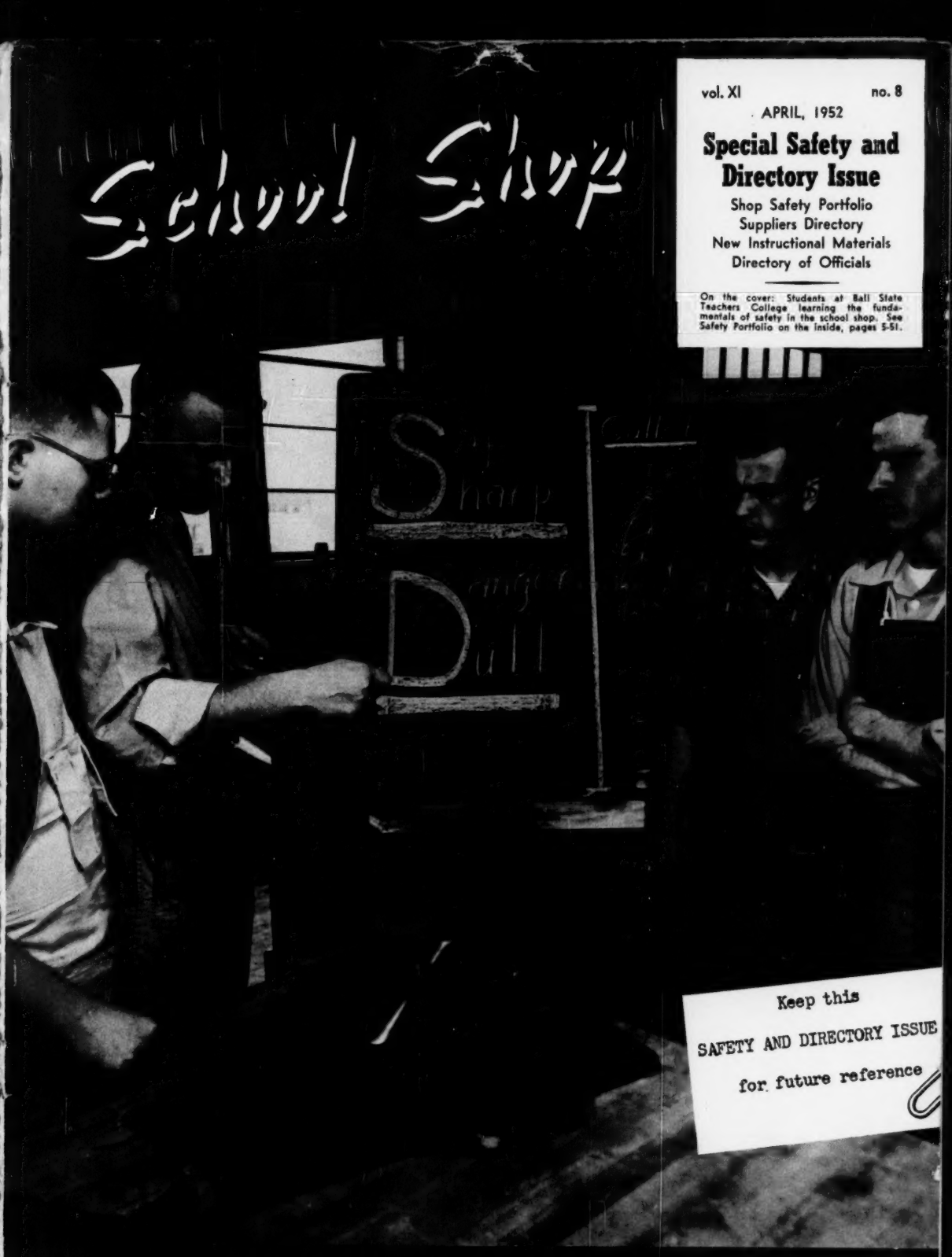
vol. XI no. 8

APRIL, 1952

Special Safety and Directory Issue

Shop Safety Portfolio
Suppliers Directory
New Instructional Materials
Directory of Officials

On the cover: Students at Ball State Teachers College learning the fundamentals of safety in the school shop. See Safety Portfolio on the inside, pages 5-51.



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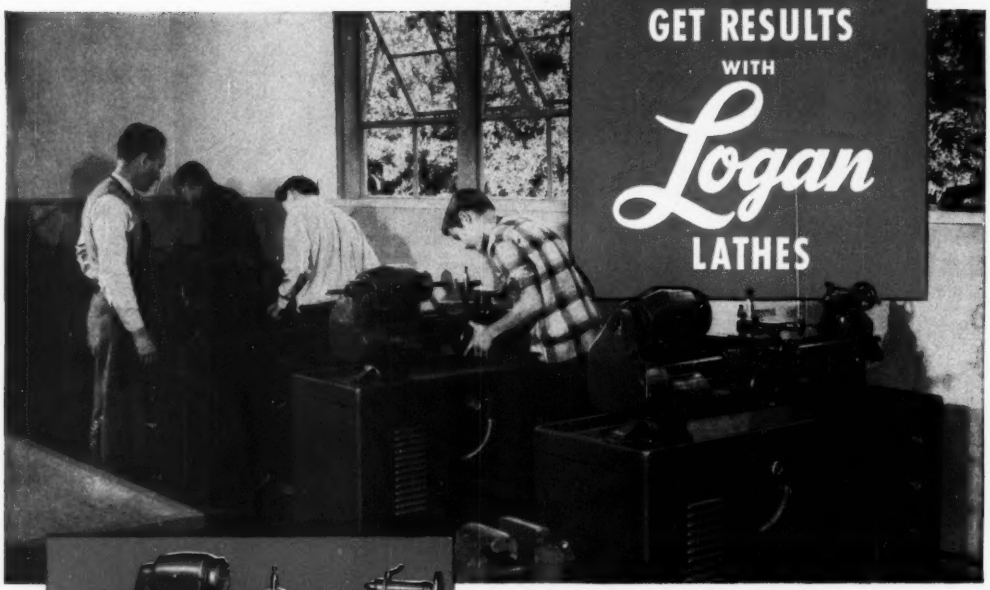

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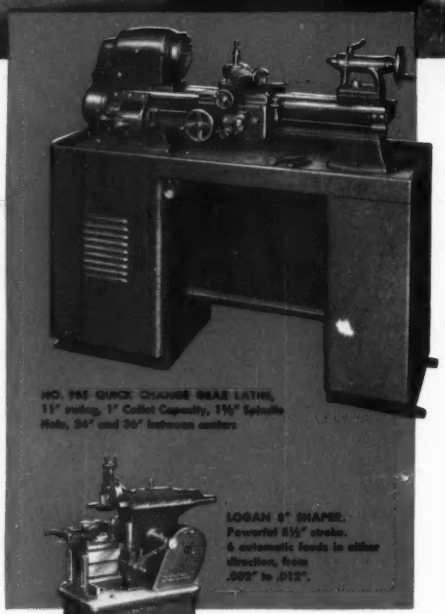

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About this issue .

Months of careful preparation went into this inclusive safety and directory issue which we are happy to present this month. The best sources of information available were sought to make this an outstanding and helpful contribution to safe practices in the school shop.

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School Shop

FOR INDUSTRIAL EDUCATION TEACHERS

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Teacher Liability—A Need for Relief

Serious accidents in school shops fortunately are so rare that the average teacher seldom thinks of who will pay the bill if a bad accident should occur in his shop. Nor does he realize that, if the accident resulted in the loss of an eye or a finger, someone would be called on to pay heavy damages. Moreover, few teachers know that the teacher himself is liable, except in the few states mentioned in the article by Tischendorf, on page 8 of this issue.

Teachers insure themselves against automobile accidents, against having their homes destroyed by fire or tornado, and against personal sickness or sickness in their families. This indicates that they are anxious to protect themselves from loss of savings and/or income, wherever hazards appear. In view of this attitude, it is reasonable to assume that, in a school shop, they will take steps to protect themselves against any suit that may be brought against them as a result of an accident there.

According to Tischendorf, there are different methods of providing this protection. The teacher may carry the responsibility himself by taking out appropriate insurance. The board of education may assume the responsibility by reimbursing the teacher for any damages the courts may assess against him. Or a state law may be enacted which places the responsibility directly on the board or city government.

In view of the salary schedule prevailing in most of our cities, it is unfair to expect the teacher to assume the burden. And it seems reasonable to expect that the board of education would frankly accept the liability for accident and make this acceptance an integral part of the teacher's contract.

This is not a matter that each teacher can solve for himself. If something is to be done, concerted action is a necessity. The American Vocational Association, the American Industrial Arts Association, the National Association of Industrial Teacher-Trainers, and, if you please, the NEA and the AFT, must join forces in one grand effort to rectify a situation which, if it were fully appreciated by the majority of teachers, would not be tolerated.

In order that some unity of action might result, it would be desirable for one of the national organizations to prepare a bill covering the situation, which would serve as a model for the individual states to follow. Each state industrial-education professional organization could then become active in securing the bill's enactment in its state legislature. This would provide state organizations with a worth-while project on which to work, and would be of lasting benefit to all teachers affected by it.

It is estimated that there are over 30,000 industrial-arts teachers in the United States. Then there are thousands of shop teachers in the area of T-and-I education. If we add to these the many principals and superintendents who should be interested in the problem, we have a group of people who could have a profound influence on legislative matters in the various states. Might we suggest, therefore, that all these individuals bring pressure to bear on their district, state, and national organizations to lay aside for the moment at least their enthusiasm for establishing objectives and evaluations of achievements, and address their combined efforts to the immediate problem of protecting the teacher from the financial loss resulting from the serious accident which we earnestly hope will never occur in his shop.—*T.D.*

Safety—A Course or a Practice?

Safety in the school shop, in industry, on the farm, on the highway, everywhere is a matter of increasing concern. This is a natural consequence of mechanization, of power and speed, and of a growing concern for human values.

There are those in industrial education who advocate a course in safety; others prefer to give safety instruction along with shop practice. So far as this writer knows, there is no experimental evidence to indicate the relative superiority of the two approaches. Of course both methods might be used, and often are. But schedules are already crowded, and the idea of teaching safety in a formalized manner separate and apart from practice does not make very good sense.

This being the case, it would appear that the soundest approach to the teaching of safety in the school shop is to make it an integral part of all instruction, relating it to specific hazards and dangers at the time and place they occur. An orderly shop, sharp and well adjusted tools and equipment properly used, the observance of time-proven practices, and an everlasting alertness to hazards and dangers are essential.

Safety is too important to be relegated to a mere course, then forgotten or disregarded in practice. To do this would be like eating all the salt one would ever need at one time and then bothering no more about salt! It is conceded that certain things may be more systematically covered in a course in safety, but this is no guarantee that the course approach will result in safe practice in the school shop or out.

Since reason and common sense seem to be on the side of teaching safety in relation to practice, let the advocates of courses in safety produce some evidence that their method is the better approach. —*A guest editorial by H. H. London, Professor of Industrial Education, University of Missouri, Columbia.*

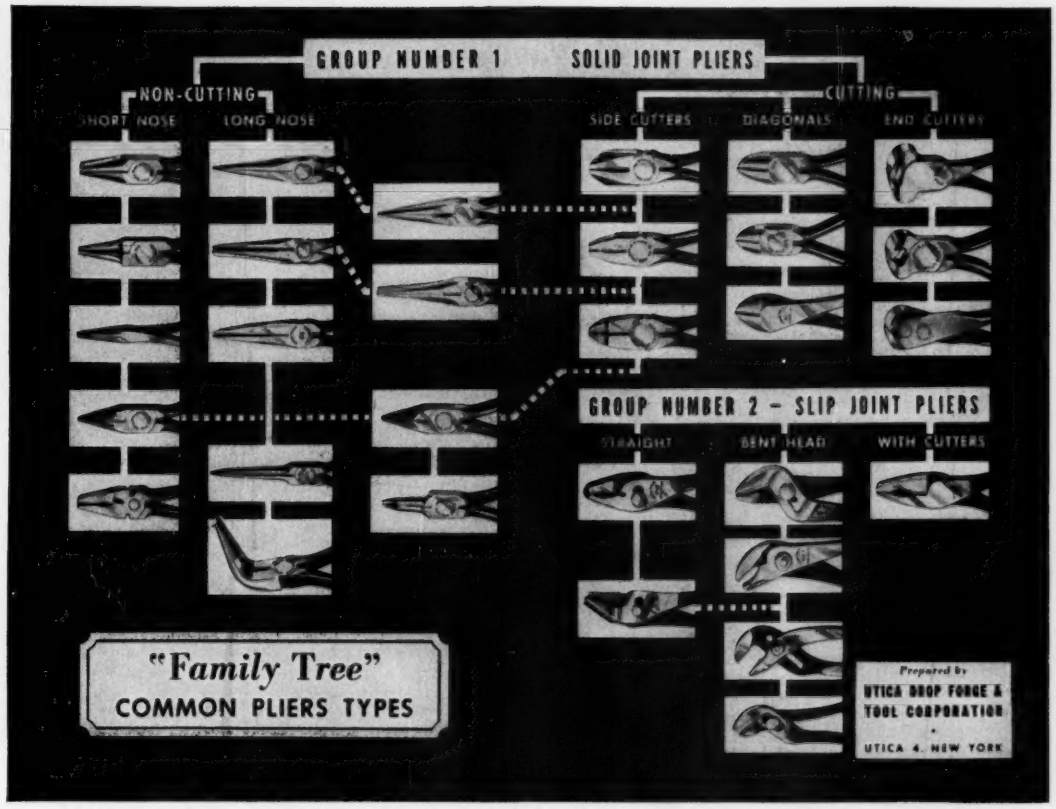
Nobody Knows

Nobody really knows how many accidents occur in school shops throughout the nation or the exact nature of these accidents. Estimates can be made from incomplete records gathered from those school systems and states where an accurate accounting is made, but they are admittedly only estimates and really do not tell the complete story.

Minor accidents are numerous as any shop teacher who has been on the job for long knows. Sometimes these develop into major calamities if infection or complications set in. Fortunately they are usually only small cuts or bruises that heal readily without serious aftereffects. Major injuries are relatively infrequent, possibly because of the emphasis good shop teachers give to safety.

Proper reporting of all accidents on a national basis would give a much clearer picture of the situation and aid immeasurably in the development of improved safety instruction. The National Safety Council has a standard accident reporting form which many school systems are now using. More schools should take advantage of this opportunity to aid in bettering the school safety record by taking part in the standard reporting program.

Occasional incidents of parents suing teachers because of alleged negligence arise each year but it is amazing how infrequently this happens in view of the vulnerability of the teacher. We shudder to think what would happen to teachers if all the potential legal actions would materialize.—*L.W.P.*



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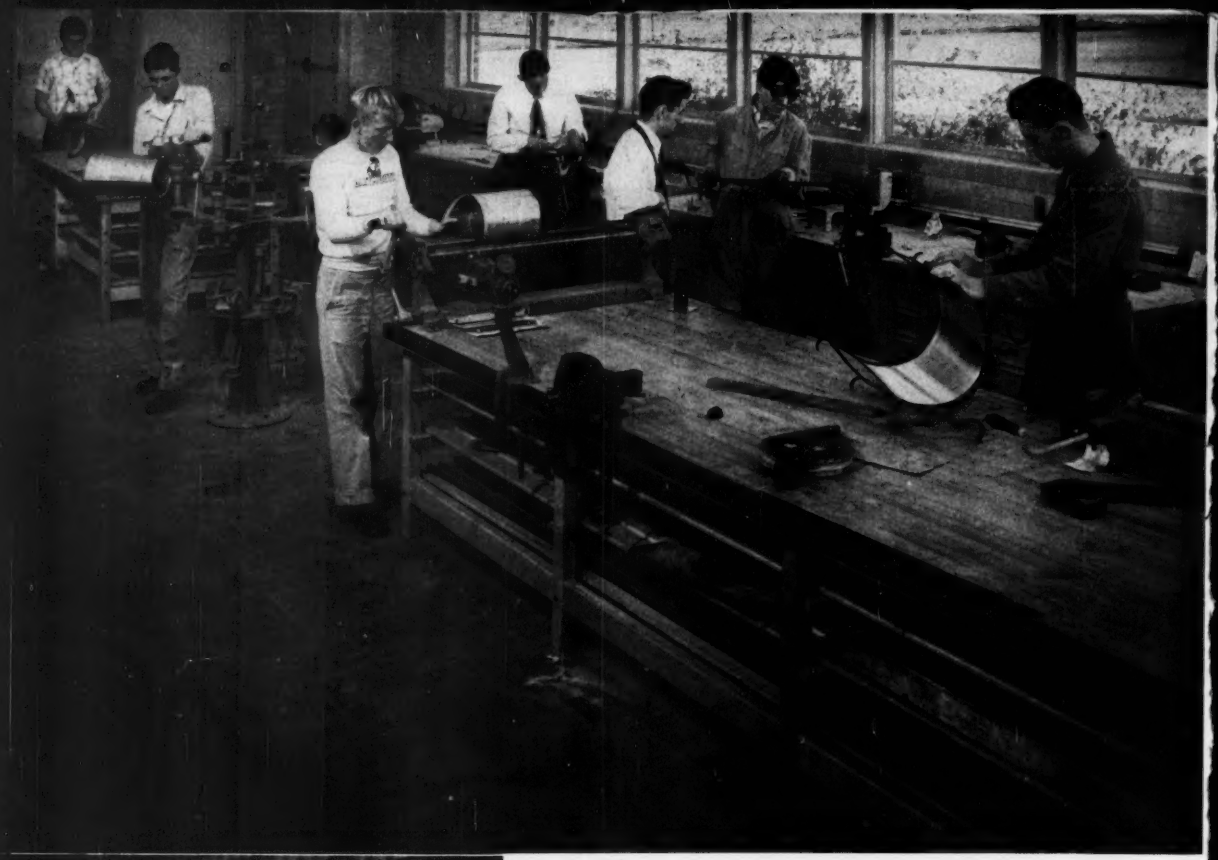

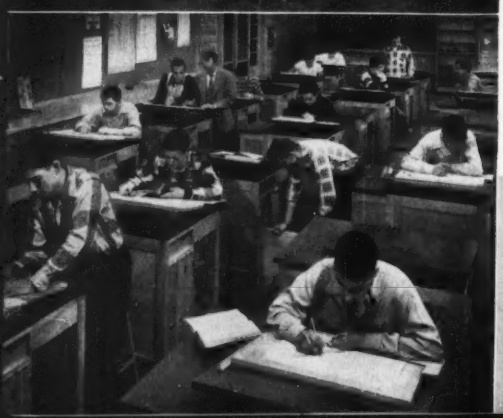

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School Shop

Safety Portfolio

Safety is a perennial problem in the school shop. Every instructor should periodically review his safety program and employ the best safety precautions as he has an obligation to his students and should provide for his own protection. On the following pages SCHOOL SHOP presents material which should be helpful to the shop teacher in carrying on an adequate safety program. The major areas of shopwork in industrial education are covered as well as some general principles and an important presentation on teacher liability. This portfolio could well be the basis for staff discussions of safety in the school shop.

Safety in the School Shop

By Thomas Diamond

Safety has been and continues to be a first consideration in the operation of a school shop. Not only are there problems of moral and legal liability, but the effective education of young people in industrial education requires that safety consciousness be a part of their working habits. Here is a discussion of general principles and their application in school shops by Thomas Diamond, Professor Emeritus of Vocational Education at the University of Michigan, Ann Arbor, and Chairman of the Editorial Advisory Board of School Shop.

SAFETY in the school shop is the general theme of this issue. The topic is one in which everyone connected with a school should have a definite interest. Parents are concerned about the safety of their children. All persons should be concerned with the problem of safety on the highway. And anyone who is interested in industrial arts in the public school should be actively engaged in promoting safe practices in the school shop. This last group includes parents whose children work in the shop. It includes teachers who have the responsibility of supervising the work in the shop. And above all it includes the pupils who use the tools and equipment found in the shop.

People govern their conduct by the recorded laws of their community. If you are a good citizen, you respect the restrictions which these laws impose on you. In some cases the restrictions appear irksome but, being an intelligent person, you recognize that, when the laws were written, they were designed to protect you, your family, and your property.

The Golden Rule

In addition to these laws we find that people have restricted their actions still further by accepting certain rules of conduct which society believes are for the greatest good to the greatest number. These rules have not been incorporated in the law of the land, but they are adhered to by every thoughtful individual who believes in the Golden Rule.

It is not enough that one abides by these laws and rules as far as they affect him personally. He should remember that he is "his brother's keeper," at least to the extent that he will do nothing that will result in injury to his brother.

In the school shop there are restrictions too, which are designed specifically to make the shop a safer place for those who have the privilege of working in it. These restrictions have not been imposed merely to inconvenience the young worker. They have received general acceptance because it is conceded that they will be of benefit to all. Because of this it behooves each pupil to observe the rules at all times. Even if he has no regard for his own safety, his desire to protect his buddy on the next bench or machine should compel him to consider safety in everything he does.

A-B-C

There is one large manufacturing concern which has adopted as its motto the letters "A-B-C." To everyone in the concern this means "Always Be Careful." This applies in the office, in the storeroom, and in the shops. It applies in the same degree to the manager and to the messenger boy. Each member of the organization is reminded constantly that his associates are depending on him to consider the welfare of the whole group in everything he does.

Such a motto would fit beautifully into any school shop group where a team spirit is a necessity. We have an example in school sports because all of them demand that every member of a team be imbued with the spirit that what he does be done with the welfare of the team in mind. This same attitude can be developed in the shop as well.

Simple Rules and Good Judgment

Complete safety in the school shop can be achieved only when everyone in the shop—pupils and teachers—adheres to certain simple rules and exercises good judgment.

Machine manufacturers are fully aware of the many hazards attached to the operation of the machines they produce. They, therefore, are striving constantly to provide guards and devices which will at least minimize the danger to the operator. In spite of what they have achieved in their efforts, they must still depend on the person who uses their machines to be ever on the alert to observe certain simple rules which are familiar to most skilled mechanics.

The human factor is always present. Many of the accidents that occur in school shops happen because someone has been thoughtless or careless, or because someone lacked consideration for the welfare of others.

If the possibility for accidents is to be reduced, pupils must be made to feel that certain safety rules must be learned and applied. It must become an obsession with them that they have a direct responsibility for their own safety as well as that of their fellow-pupils. Safe practice must be in their minds constantly. The instructor must emphasize this frequently by suggesting certain rules to which everyone in the shop must conform.

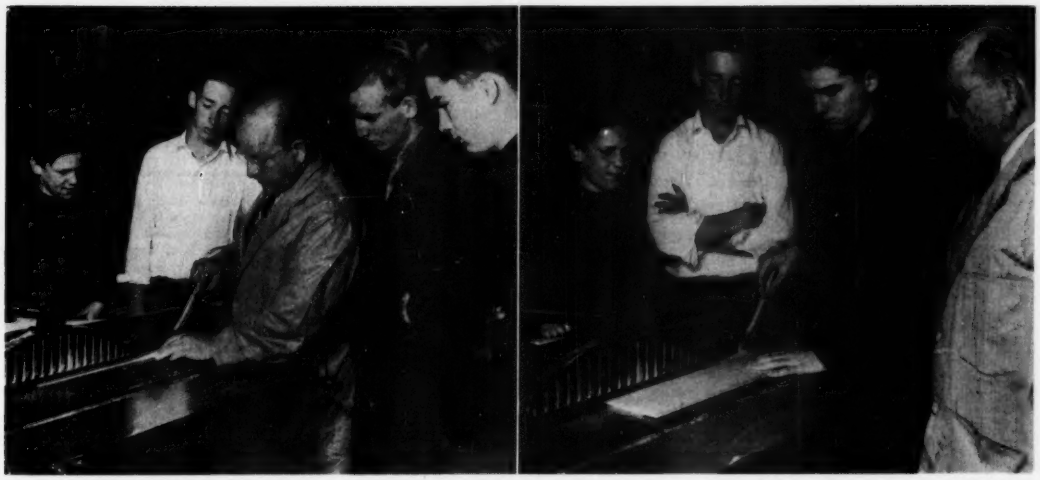
Some of the rules of safety which might be adopted in a school shop follow. These must be more than decorations on the bulletin board or fine definitions which the pupils recite glibly in class. They must constitute *law* in the shop—a law code which needs no court to administer. Sooner or later the individual who violates the law is punished, either through personal injury or through the mental torment which comes from having been the cause of injury to others.

The law code should not be handed down as an edict from a higher body. It might be developed through a cooperative effort between teacher and pupils, and it might be enforced by the pressure that comes from group action. Moreover, whatever action is taken by the group will be based on rules of conduct which have been determined by the group by democratic procedure. Among these rules might appear such statements as the following:

Some Safety Rules

1. Each individual must consider the safety of all members of the group. While any action he takes may not affect him personally, if it endangers someone else it should be avoided.

2. Courtesy always pays dividends. Courtesy when driving may prevent a collision. Courtesy in the school shop may mean that your turn at the saw may be deferred but, on the other hand,



An instructor in woodworking in the San Francisco, California, schools here demonstrates the use of the pusher when sawing narrow boards on the circular saw. Note that the guards are in place and operating smoothly and that the student has an opportunity to perform the operation himself immediately after the demonstration. The teacher then carefully supervises the pupil as he performs the same type of operation.

it may eliminate the hurry which so frequently results in disaster for someone.

3. Every one in the class knows that you are strong so do not attempt to demonstrate your strength by lifting heavy pieces of stock or equipment. Your associates are cooperative and will be glad to help. A hernia is an unpleasant thing to carry around with you.

4. In every well-organized shop, space is provided for waste material. When scrap is placed in the space reserved for it, the chances of it becoming a hazard are minimized. If you are a safe worker, you will see to it that all waste material is placed where it belongs.

5. Throwing things around the shop can be lots of fun. However, a school shop is not a playground and the right-thinking student will surely sacrifice a little fun if by so doing he prevents an accident.

6. Seeing-eye dogs are expensive. Moreover, most people like to see where they are going, as well as to enjoy the beautiful views that nature provides. One way to lose this wonderful gift of sight and to put you in a position where you must depend on a dog is to neglect using safety glasses when working on a machine or when chipping or performing other operations where particles may fly about. Glasses are cheap, but eyes are beyond price. Use safety glasses and be protected.

7. If in your opinion a hazard exists anywhere in the shop, do not delay in bringing it to the attention of the instructor.

8. No injury is too small to receive attention. Small cuts or scratches may become infected unless treated promptly.

9. Wear gloves when handling rough or heavy material to protect the hands.

10. Sliding down ropes, cables, or ladders is fun, but it has the disadvantage of being dangerous.

11. Fingers are valuable assets to all. How valuable they are is not fully appreciated until you have to get along without them. Intelligent people realize that it pays to conserve their assets so they keep their fingers away from machinery, especially that which is armed with sharp cutting tools.

12. Machine guards are designed by the manufacturer for your protection. While some of them may appear to slow an operation, you will be exercising good judgment if you use them for the purpose for which they are intended.

13. Keep the guard on the machine. If you put it on the floor, it increases the hazard of operating the machine and, in addition, presents an obstacle to passers-by who might stumble over it.

14. The operation of a machine calls for concentration by the operator. Refrain from taking his attention away from the job, even for a single moment.

15. Always use the belt shifter when moving belts and be sure the belt is at rest before trying to shift it.

16. If it becomes absolutely necessary to approach the operator of a machine, it should be done in such a manner that he will not be startled as an accident might result.

17. A "must" when operating the grinder is to keep the rest close to the wheel. A wide gap may permit the piece being ground to get between the rest and the wheel. This may cause the wheel to break or your fingers may be pinched. The least you can expect is that the job will be spoiled.

18. Before starting a lathe, be sure that the work is fastened securely. This is particularly important with a lathe that runs at high speeds.

19. We have been told that having a rope drawn tightly around the neck is an unpleasant experience. If you wish to avoid such an eventuality, never wear a loose tie when working at a machine. One such experience will kill any enthusiasm you may have for operating a machine.

20. Did you ever have a boy who was bigger than you twist your arm until it hurt? If your sleeves are not rolled up when operating machine, you may find that the big boy was only playing. Wearing loose clothing of any kind may cause you to be pulled into the machine and you won't like that.

21. When adjustments have to be made on a machine or when taking measurements on work in the machine, be sure that the machine is at a full stop.

22. When safety appliances are available, do not start a machine until you are certain that they are properly placed and in good working order.

23. Use care when using sharp tools to avoid danger. This danger is multiplied many times when the tools are dull. Always be sure the tools you use are sharp.

24. Always place tools or materials where no one can trip over them or where they will not fall on someone. ★

You May Be Liable

By E. W. Tischendorf

Teacher liability for accidents to students under his jurisdiction can create serious problems for the teacher. Here is a discussion of this liability with suggestions for meeting the problem. E. W. Tischendorf is Acting Head, Department of Industrial Arts, Kent State University, Kent, Ohio.

DO YOU know that you may be liable for damages as a result of an injury to a student in one of your classes? Do you know that there is a way to protect yourself against such damage suits and that some states have laws on the books which provide such protection?

Lawsuits involving damages can be costly to the teacher, even though he may be proved innocent. When proved guilty and damages are assessed, the cost to the teacher may be catastrophic.

Every teacher should be aware of the situation in his particular state so that he can protect himself and know what his legal responsibilities are. State and local groups of shop teachers should take action to learn what the teacher's responsibilities are and to secure protection for him.

In a minority of the states, statutes provide for more or less immunity of teachers against liability for damages resulting from injury to pupils under their supervision. The states of California, Connecticut, New York, and New Jersey have enacted legislation to protect teachers against financial responsibilities in lawsuits because of liability for injuries to pupils under their supervision. This immunity seems to exist regardless of the cause of the accident or the extent to which the responsible teacher is negligent. It is to be emphasized that the teacher is not immune from the liability for the injury to the pupil, but that he is immune to the costs which might evolve from such an accident. Boards of education in these several states assume the responsibility for the costs or damages.

Excerpts of pertinent statutes and briefs of a few cases relating to liability for tort (tort is the commission or omission of an act by one without right, whereby another receives some injury, directly or indirectly, in person, property or reputation) in these states are presented here.

California.—California, by express statute, abolishes the common-law principle of nonliability of the school district for tort. Teachers are made liable for their own negligence by statute; however, the school district is liable for the negligence of its teachers.

Act 5150: *Liability of Public Officers.* Sec. 3: Municipalities, _____, school districts or the State of California, may insure their officers against any liability, other than a liability which may be insured under the workmen's compensation insurance and safety act of 1917, for the injuries or damages resulting from the dangerous or defective condition of _____, works and property, and due to their alleged negligence or carelessness, as specified in this act, either by selfinsurance, or in any insurance company authorized to transact the business of such insurance in the State of California; and the premium of such insurance shall be a proper charge against the public treasury of such municipality, county, city and county, school district, or the State of California, as the case may be.

Ridge et al. v. Boulder Creek Union School District of Santa Cruz County. 140 Pac. (2d) 990 (Cal. 1943). Action for personal injuries received while operating a power saw. From a judgment for the plaintiff, the school district appealed; and from an order striking plaintiff's cost, plaintiffs appealed. Judgment and order was affirmed. In woodworking class an instructor used an unguarded saw and failed to instruct students not to use the unguarded saw. A 17-year-old boy used it and was hurt. Statute creating liability of school district for any judgment against it does not include liability for costs encumbered in obtaining such judgment.

Connecticut.—Teachers can recover from the board of education financial loss resulting from suit because of a negligent act or omission performed within the scope of their employment. The school district is not liable for the negligence of its employees but is obliged to protect the employee from financial loss.

Sec. 191. *Protection of Teachers and Employees in Damage Suits.* Each board of education shall protect and save harmless any member of such board or any teacher or other employee thereof or any member of its supervisory or administrative staff, and the state board of education, the board of trustees of each state institution and each state agency, board or department which employs any teacher, _____, provided such teacher, member or employee, at the time of the accident resulting in such injury, damage or destruction, was acting in the discharge of his duties within the scope of his employment or under the direction of such board of education, board of trustees, state agency, department or managing board. 1633a C. S. 1949.

New Jersey.—Legislation provides for payment of damages in event of suit against teachers for liability incurred while performing the duties of their profession.

Public Laws of 1938: Ch. 311: *Board To Assume Liability of Teachers, Supervisors, and Administrators.* It shall be the duty of each board of education in any school district to save harmless and protect all teachers and members of supervisory and administrative staff from financial loss arising out of any claim, demand, suit or judgment by reason of alleged negligence or other act resulting in accidental bodily injury to any person within or without the school building; provided, such teacher_____, at the time of the accident or injury was acting in the discharge of his duties within the scope of his employment and/or under the direction of said board of education; and said board of education may arrange for and maintain appropriate insurance with any company created by or under the laws of this State, or in any insurance company authorized by law to transact business in this State, or such board may elect to act as self-insurers to maintain the aforesaid protection.

New York.—New York abolished the antiquated precept of government nonliability for tort; therefore, liability of schools rests on the presence of negligence on the part of the teacher. Boards of education by statute are required to save teachers harmless in connection with suits brought against teachers relating to injuries suffered by pupils while the teacher was acting in the scope of his employment. The law also authorizes boards of education to take out insurance against such liability or to act as self-insurers. If a teacher should

have a verdict rendered against him in this manner, the board of education must reimburse him from public funds.

Thomas et al. v. City of New York et al. 35 N.W. (2d) 617; 285 N.Y. 496 (N.Y. 1941). Action against the board of education for injuries received in a school shop. From a judgment directing a verdict for the defendant, the plaintiff appealed. Judgment was reversed and a new trial granted. A 15-year-old boy suffered the loss of an eye when a scriber of a speed lathe flew from its fastening. It was claimed that the board was negligent in allowing the boy to use a broken and defective machine. The trial judge set the verdict aside on the grounds that there were no facts to support a verdict. The court of appeals held that the jury could have found negligence from facts presented, and reversed the decision of the trial judge. The board of education failed in its duty to be reasonably careful and prudent in furnishing satisfactory equipment.

Reeder et al. v. Board of Education of City of New York. 38 N. Y. S. (2d) 55 (N. Y. 1942). Action against the board of education and a teacher to recover for injuries sustained, for medical expenses, and for loss of services. Before the trial of the action it was discontinued as to the teacher. From the judgment in favor of the plaintiffs, the board of education appealed. Judgment affirmed. A boy, at the request of his teacher, assisted the latter in moving from one room to another an automobile motor which was mounted on a dolly. While thus engaged the motor became dislodged, severely injuring the boy's hand. The boy demanded damage for injuries, while his father sued for medical expenses and loss of services. Both teacher and board of education were named as defendants, but before trial the action was discontinued against the former. Jury awarded the boy $5000 and his father $200 after holding the board for negligence in not providing proper safeguards on the dolly.

DeBenedittis et al. v. Board of Education of City of New York. 77 N. Y. S. (2d) 30 (N. Y. 1946). Action against the board of education to recover damage for injuries received. Judgment for the plaintiff and the defendant appealed. Judgment was affirmed. In a school shop a boy was attempting to remove a piece of metal from a machine. A fellow student stepped on the treadle which started the machine and injured the boy. It was claimed the accident would not have happened except for the teacher's concurrent negligence in failing to observe whether the machine was being used or tampered with by other students. Under the educational laws, a board of education is responsible for the negligence of its administrative and supervisory staff and its teachers, resulting in personal injuries while acting within the scope of their employment.

Washington.—In this state, pertinent legislation is especially unique. Action may be maintained against a school district; however, there are exceptions. Liability of the industrial education teacher for pupil accidents seems to be an exception.

School Laws of 1945. Sec. 594. *Restriction on Action Against School District.* No action shall be brought or maintained against any school district or its officers for any noncontractual acts or omission, of such district, its agents, officers, or employees, relating to ----------, or manual training equipment, whether situated in or about any schoolhouse or elsewhere, owned, operated, or maintained by such school district.

In states other than the five heretofore discussed, either the state is immune from suit by constitutional provision and the school district as an agency of the state, enjoys the same privilege; or, no mention is made of liability of the school district and therefore common-law immunity applies.

It is in these numerous states that teachers must assume the full burden of court costs and damages which may evolve from injury to pupils having accidents under their supervision.

Briefs of a few court cases in states in which school districts are immune from liability damages due to negligence of its employees follow:

MAINE, *Brooks v. Jacobs.* 31A (2d) 414 (Maine, 1943). Action of negligence against a teacher for personal injuries was sustained. The verdict was for defendant but the plaintiff appealed and final judgment was in his favor.

The plaintiff was injured when defective staging around a building caused him to fall. He was working voluntarily at the request of his industrial-arts teacher removing snow from the building. He received class credit for this work. He claimed the defective staging to be the result of negligence of the industrial-arts teacher.

It was found that the defendant had full charge of the construction and was therefore liable for any act of negligence proximately causing injuries of the plaintiff. The point of the law was that one may be held individually liable in a civil action, to one who has received special injuries in consequences of his failure to perform, or negligence in the performance of, his official duty.

PENNSYLVANIA, *Wilcox, a Minor, et al. v. Dunmore School District.* 43 Lac. Jr. 13 (Pa. 1941). Plaintiff brought action in trespass against the defendant school district. The judgment was in favor of the school district.

The plaintiff's son was burned by alcohol which another pupil ignited in the industrial-arts room. The plaintiff claimed that the school district created and allowed a nuisance to exist.

The point of the law was that a school district being a public charity and a state agency and performing governmental functions is not liable, while acting within the legitimate scope of these functions, for the negligence of its officers.

Knowledge of the teacher's legal status where court action accrues from an accident to a pupil under his supervision should influence the behavior of industrial-education teachers, supervisors, and administrators. There are definite responsibilities which the teacher must assume so that he will not be charged as negligent by the courts. Some specific conditions whereby a teacher might be considered negligent are given in an article entitled "Accident Liability of Shop Teachers" by the writer in the May, 1951, number of *The Education Digest.* In the majority of the states, the teacher has no special legal protection, because of the status of his position as a teacher. Regardless of the protection against financial loss, there is always a moral obligation for teaching safety and avoiding injury to pupils.

What should the teacher do to protect himself against financial obligations in states where he must assume liability for pupil accidents? The answer for immediate protection is to carry liability insurance for the specific purpose. State industrial-education associations should consider offering group insurance to their members. Membership fee in the association might include the premium for insurance. Only teachers wishing to have protection against damages for pupil accidents need pay the necessary additional amount. Others pay the usual annual membership fee. A policy of 5 to 10 thousand dollars protection under the group plan is available at $3.00 per year. Double that amount of protection can be had for a small additional premium.

Eventually, it seems that every state should have progressive legislation pertaining to teacher liability similar to that in a few states heretofore indicated. Teachers should have protection equal to that which other employees enjoy. Individually and through various associations, teachers should promote legislation which will give them the desired protection.

The writer wishes to recognize as an invaluable reference for this article and to recommend to those interested the reference below. It is available on an inter-library loan basis. ★

Ted Joseph Satterfield, *"Legal Aspects of Tort Liability in School Districts,"* Doctor's Thesis, Teachers College of Temple University, (1949).

Industry Wants School-Shop Safety Training

By LeRoy A. Faulkner

Shop safety is one of the major problems of both the schools and industry. The closer school practices are to those in industry, the easier the transition will be for students when they enter the industrial field. Here are some suggestions for adapting methods used in industry to the school shop. Mr. Faulkner is Supervisor of Industrial Plant Service at Liberty Mutual Insurance Companies, Boston, Massachusetts.

SAFETY is considered by most educators to be a problem directly applied to the safety of individual pupils during the time they are going to or coming from school, or on school property. It is recognized that this is a responsibility of the teacher, but the development of safety consciousness goes much beyond the personal safety of the pupil.

Occupational Accidents—1950

The 1951 Edition of the National Safety Council publication, *Accident Facts*, gives the following information on occupational accidents in 1950:

Deaths

	Total	Per 100,000 Manhours	
	1950	*1950*	*1949†*
All Industries	15,500	27	26
Manufacturing	2,600	17	16

All Injuries*

	Total	Per 100,000 Manhours	
	1950	*1950*	*1949†*
All Industries	1,950,000	3360	3250
Manufacturing	425,000	2810	2660

*Includes deaths
†1949 rates include revisions

It should be mentioned that the total occupational fatalities in 1950 exceeded those in 1949 by 500 and, in the same period, the injuries increased by 100,000. The number of people employed in 1950 was greater than in 1949, but the increase was not in the same proportion as the increases in deaths and injuries.

Accident Costs

Total Cost in 1950	$2,500,000,000
Visible Costs	$1,200,000,000
Indirect Costs	$1,300,000,000
Cost per Worker to Industry	$ 40

Visible costs cover those suffered by workers as well as by industry, and include such items as wages, medical expenses, and insurance. Indirect costs represent the value of damaged equipment and materials and production slowdowns. The cost per worker is considered to be average, and includes both direct and indirect costs to industry alone.

Time Lost Because of Work Injuries

	Man-Days
Total Time Lost in 1950	274,000,000
By Injured Workers	44,000,000
By Other Workers	230,000,000

Time lost by injured workers includes only the actual time lost during the year from disabling injuries. These figures are quoted in order to emphasize the fact that, in addition to the humanitarian aspects of industrial safety, one of the biggest problems facing the management of industrial plants today is the cost of industrial accidents.

Economic Factors

The "all industry" lost-time accident frequency has decreased from approximately 30 per million man-hours worked in 1925 to approximately 10 in 1950. However, the general trend at the present time is a slight increase in accident frequency. This indicates that greater efforts than ever before are necessary if the problem is to be kept under control. This is particularly true since the introduction of new processes and new materials have brought into being new exposures, both mechanical and hygienic. Added to this, medical and hospitalization costs are increasing, all of which is resulting in a rising cost-per-case figure.

An Analogy—The School Shop and the Industrial Plant

It would be presumptuous to attempt to outline in detail an ideal shop program that would include safety as an integral part of vocational training. This

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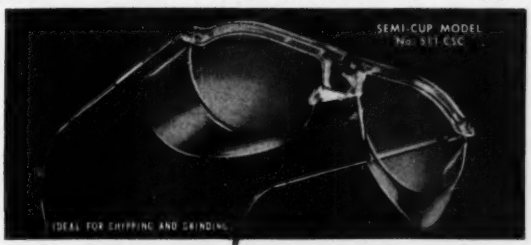

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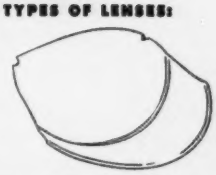

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Adequate first-aid facilities are a necessity in the school shop, as in industry, to minimize the extent of an accident. The teacher should be trained to provide minimum medical service.

has been done on several occasions, and is available in published form. The National Safety Council devotes many of its activities to school-shop safety. References to their material may be obtained from the Council by anyone interested.

Vocational Technical Training for Industrial Occupations, issued by the U. S. Office of Education, is an excellent source of information. The *School Shop Safety Manual,* published by the Board of Education of the City of New York, is a complete text on the subject.

The safety education of pupils, at all levels, should be the same, varying only in degree; the degree depending on the age of the pupils or the local conditions and needs. It should be a continuous educational process, intended to carry over into actual industrial plant conditions, after the pupils have left school and gone to work.

The ideal school-shop safety program includes a safe environment and the enforcement of safety rules. It should also include instruction that will develop the proper attitudes, skills, and behavior patterns needed by the pupils to avoid and prevent accidents.

Since the school shop should be considered to be a miniature version of an industrial plant, the safety program could parallel that of the plant, at least to some degree. Therefore, in evaluating the effectiveness of the school-shop safety program, a direct analogy is possible.

Sustained Management Support and Direction

In the industrial plant it is necessary that management impress on the employees that it is sincere in its attitude regarding safety. To achieve this it must make an honest effort to eliminate physical hazards. **School administrators, who are responsible for school shops, should consider that they have a similar duty insofar as the school is concerned.**

Adequate Safety Organization

The basic safety organization for each industrial plant is patterned to fit its operating organization. It should include a safety engineer and a staff, charged with the specific responsibility of carrying on safety activities. In a smaller plant these activities might be carried on by an employee, as a part-time job.

Such a plan is a "must" in all school shops. A safety director should be appointed, the position being assigned to a different individual each month. Specific duties could be outlined, and the director considered as a monitor of safety activities.

Active Participation by Shop Supervision

The best methods of doing a job are invariably the safest methods. The use of best methods by employees requires active participation on the part of the supervisor in the following typical ways:

1. Cooperate actively with employees, person in charge of accident prevention, committee, and management.
2. Maintain compliance with best working conditions:
   a. Detect and eliminate, or report for correction, all physical hazards.
   b. Study the proper use, location, and maintenance of equipment and physical facilities.
   c. Study the proper handling of material and equipment.
   d. Study the proper storage of material.
3. Detect and eliminate new hazards and unsafe practices promptly.
4. Place the right person on the right job.
5. Conduct continuous, specific, on-the-job instruction and training.
6. Insist on good housekeeping.
7. Insist on immediate first aid for all injuries.
8. Investigate all accidents thoroughly.

In the school shop the teacher or group leader could be expected to function in the same capacity as an industrial plant supervisor. By assuming such responsibilities, group leaders gain valuable experience as supervisors and good work habits and practices are instilled in the minds of the students.

Effective Employee Education

There is a definite place for employee education activities in any industrial plant accident prevention program. This might be carried on by means of the following mediums:

1. Accident prevention manuals
2. Plant and department score boards
3. Safety contests
4. Employee publications
5. Films
6. Handouts, posters, etc.

The use of many, if not all, of the above-mentioned mediums is applicable to school-shop safety programs. Many of these items are

(*Continued on page* 59)

Safety in the Auto Shop

Third most dangerous of the school shops, the auto shop poses a special problem in safety education. Its graduates go out into a field where often there is little in the way of formal safety programs. With the increased demand for well trained mechanics it is imperative that the auto-shop teacher do his utmost to develop a sound, well coordinated program of safety education. Here is a check list for rating your shop and some suggestions on integrating safety into your overall program.

THE auto shop is the third most hazardous of the school shops says the National Safety Council. The two shops, however, that rank above the auto shop in frequency of accidents—the wood and machine—have considerably higher enrolments. Consequently, on a comparative basis the record of the auto shop does not look favorable. The accident prevention record of the commercial garage, especially the small one, is none too good, and the old-time three-fingered mechanic is still much too common.

With the increase in the number of motor vehicles registered in recent years, the demand for well-trained mechanics has focused the auto industry's attention on the facilities available for producing them. Vocational educators and representatives of industry, working together, have tackled such items as teacher-training programs, automotive curriculum development, standards of student proficiency, and building and equipment requirements.

One of the areas in which industry has shown a major interest is the improvement of safety training. The goal has been to better prepare the student for the day he enters industry or commerce. Many automotive students will get jobs in small shops and service stations where there are no safety programs similar to those found in large industries. Others will set up their own garages. The schools will provide the only formal safety training that many a future mechanic will receive. Responsibility for proper safety training is on the shoulders of the school-shop teacher. If the safety record of the garage is to improve, it is squarely up to you, the teachers of the mechanics of tomorrow.

Most safety programs boil down to the ability of the instructor to indoctrinate the belief in the minds of his students that *the safest way of doing the job is the most efficient way.* Individual attitudes toward safety and procedures of teaching, however, are not the only considerations. The equipment and the physical layout of the building are important. Ideally safety should be designed and built into a structure. In education, oftentimes we have to be content with far from ideal conditions. But, if we analyze what we lack, bring it to the attention of administrators and, above all, do what we can ourselves, we can improve the safety record of the auto shop.

Here are a few practical hints and a check list with which to rate your shop. No numerical values or "good," "bad," or other rating scheme is attempted because any such evaluation would be arbitrary and without too much practical use in rating the individual shop. The check list is not all-inclusive. It is intended rather to point out a few of the main items to be considered in judging your shop. Specific hazards found in particular operations are not all listed in detail as each instructor should be well-versed in these items. It is a good idea, however, in rating your own shop to consider the special hazards present, and also to review the basic rules such as *care in using the car hoist, safe use of hand tools, rules of fire prevention,* and other seemingly elementary considerations, just to be sure that you or your students have not become careless. By making up a check list similar to this, an instructor should be able to get an idea how he and his shop rate on the safety question.

Check List

Building

1. Is the shop laid out to provide adequate working space? Yes___. No___.
2. Are spray-painting booths properly constructed? Yes____. No____; ventilated? Yes_____. No_____; 30 feet from any open flame? Yes_____. No_____.
3. Are vapor cleaning tanks ventilated? Yes_____. No_____; 30 feet from any open flame? Yes_____. No_____.
4. Is there an engine-exhaust ventilating system? Yes_____. No_____. Is it in proper working order? Yes_____. No_____.
5. Is there adequate ventilation in the room? Yes_____. No_____.
6. Is the lighting, both general and special, adequate? Yes____. No____.
7. Are passageways kept clear? Yes _____. No_____.
8. Are safety zones clearly marked around machines? Yes____. No____.
9. Is there ample inside and outside parking space? Yes_____. No_____.

Equipment

1. Is there a well-equipped and clearly-marked first-aid cabinet? Yes_____. No_____.
2. Are fireproof storage cabinets and waste containers provided? Yes____. No_____.
3. Are fire extinguishers available? Yes_____. No_____. Are they in working order? Yes_____. No_____.

How many safe features can you spot in this picture? Note clean, well-lighted shop, built-in engine exhaust ventilation system, round-bottomed fire bucket, and substantial axle supports. The student under car has on coveralls and boys have closed the door before working underneath.

4. Is the load on the electrical facilities kept within safe limits? Yes____. No____.
5. Are hoists, jacks, and other lifting devices in good working order? Yes____. No____.
6. Are welding outfit regulators and hoses in good condition? Yes____. No____.
7. Are safety guards provided on equipment? Yes____. No____.
8. Is personal safety equipment such as gloves, coveralls, goggles, and safety shoes provided when necessary? Yes____. No____. Are they used? Yes____. No____.
9. Are hand tools such as hammers, chisels, and wrenches kept in good condition? Yes____. No____. Are they replaced when defective? Yes____. No____.
10. Are all tools and machinery kept free from grease? Yes____. No____.
11. Are drop cords and cords on portable electrical equipment in good condition? Yes____. No____. Are they properly grounded? Yes____. No____.
12. Are flammable liquids stored in marked containers? Yes___. No___; away from open flame or heat? Yes____. No____.
13. Is all mechanical equipment in good working order? Yes____. No____.
14. Are all danger areas well marked? Yes____. No____. Are special precautions to be observed with equipment, such as the wheel-balancing machine, well posted? Yes___. No___.

Students at Chicago's Lane Tech demonstrate proper technique by positioning hoist directly over load, avoiding sway and possible accident.

15. Are safety manuals and references readily available to both teacher and students? Yes____. No____.

Shop Procedures

1. Is there a traffic-control system to prevent hazards to students working on cars? Yes____. No____.
2. Is sufficient preparatory and clean-up time allowed? Yes____. No____.
3. Is there an effective system of housekeeping in operation? Yes____. No____.
4. Are adequate storage facilities provided? Yes____. No____.
5. Have specific places for all tools and equipment been assigned? Yes____. No____.
6. Have provisions been made with other instructors and students using the shop for coordinating housekeeping and other chores? Yes____. No____.
7. Are all accidents reported promptly? Yes____. No____.
8. Is there a standard accident report form? Yes____. No____.
9. Is a thorough safety inspection conducted periodically? Yes___. No___.

Teaching Methods

1. Are students given the reason for following certain procedures? Yes ____. No____.
2. Are new pupils indoctrinated in "safety thinking"? Yes___. No___.
3. Are the "old timers" reminded of safety rules to prevent them from getting careless? Yes____. No____.
4. Do you set a good example *at all times?* Yes____. No____.
5. Is the adolescent's natural curiosity considered to prevent him from "getting into things"? Yes___. No___.
6. Is horseplay prevented? Yes____. No____.
7. Is student *alertness* stressed? Yes___. No___.
8. Are students urged to report unsafe conditions? Yes____. No____.
9. Are natural differences in ability considered in teaching safety? Yes____. No____.
10. Are students urged to *take their time* and not rush into an operation without considering both job needs and safety requirements? Yes___. No___.
11. Are students adequately briefed on *all* new operations? Yes___. No___.
12. Are students given a part in helping determine safe procedures? Yes___. No___.
13. Are students given a hand in enforcing safety rules? Yes____. No____.
14. Is the student taught to analyze and plan the job, considering both the technical and safety aspects of the job? Yes____. No____.
15. Is a positive approach used in teaching safety? Yes____. No____.
16. Is safety instruction well correlated with all shop work? Yes____. No____.
17. Does your program develop enough safety consciousness in the individual student to enable him to determine the hazards in an operation new to him after he has left your shop and is working? Yes___. No___.

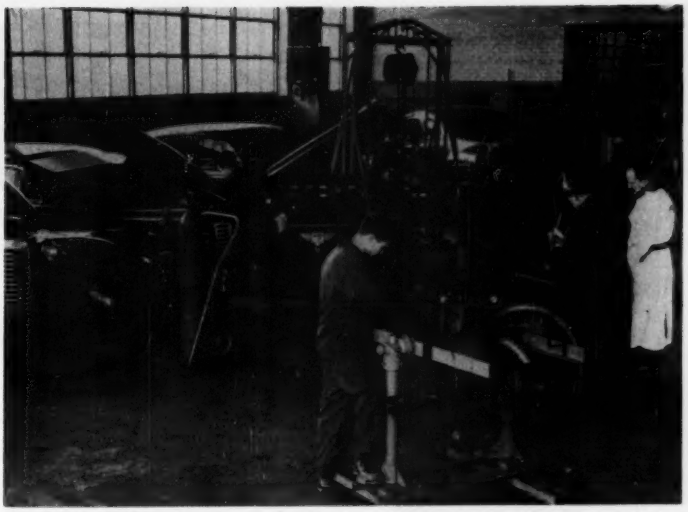
The Instructor

1. Do you keep up to date on the newest developments in safety education? Yes____. No____.
2. Do you know how to fight fire? Yes____. No____.
3. Do you have a good knowledge of first aid? Yes____. No____.
4. Do you know where the nearest emergency medical care is available? Yes____. No____.

Hazard Preventives

1. Is caution always used when starting or running a car engine? Yes____. No____.
2. Are students warned against working on running engines? Yes____. No____.
3. Are students warned against pouring gasoline in the throat of a carburetor in order to start an engine? Yes____. No____.
4. Are the doors closed, no objects on the fenders, and no one working above when a student is underneath a car? Yes____. No____.
5. Is all jacking and blocking double checked before a student is allowed to work underneath a car? Yes____. No____.
6. Is a maximum speed limit of four miles per hour observed when driving a car into or from the shop? Yes____. No____.
7. Are the running boards and bumpers clear of passengers and equipment whenever a car is in motion? Yes____. No____.
8. Before removing wheels from a car, or prior to working on it, is it supported under the axle or the frame in several places? Yes____. No____. Are the remaining wheels blocked so that the car will not move forward or backward? Yes____. No____. Do you check the jacking and blocking personally? Yes____. No____.
9. Are the doors closed on cars before they are moved? Yes____. No____.
10. Is the bench and vicinity of work kept clean? Yes____. No____.

11. Is the floor kept clear of tools, parts, equipment, and other objects? Yes____. No____.
12. Are tools carried in a proper kit or container? Yes____. No____.
13. Is the crane or hoist brought directly over the weight to be lifted? Yes____. No____.
14. Are slings and cables double checked to see that they are properly caught and balanced before hoisting the car or engine? Yes____. No____.
15. To be doubly safe are axle stands also used to support weight of car when using the hoist? Yes___. No___.
16. Do axle supports have a wide base and a large enough top? Yes____. No____.
17. In operating any machinery, does the student always check to see that no one will be endangered before proceeding? Yes____. No____.
18. Is caution observed when working near gasoline? Yes____. No____.
19. Is the battery ground strap disconnected before working on wiring or engine? Yes____. No____.
20. Are no-smoking rules enforced? Yes____. No____.
21. Is care used to avoid spilling battery acid? Yes____. No____.
22. When charging batteries, are precautions taken against the hazards of hydrogen gas emitted in the operation? Yes____. No____.
23. Is a supply of bicarbonate of soda available to neutralize any spilled acid? Yes____. No____.
24. Are precautions against fire observed when welding or brazing? Yes____. No____.
25. Are friction lighters always used in lighting welding torches? Yes____. No____.
26. Are hands kept free from oil and grease when handling welding equipment? Yes____. No____.
27. Are welding regulators and regulator fittings handled with care to avoid damaging them? Yes____. No____.
28. Are oxygen cylinders stored away from fuel cylinders? Yes___. No___.
29. Are goggles *always* worn when welding? Yes____. No____.
30. Are goggles worn in all grinding operations? Yes____. No____.
31. Are respirators used when spray painting? Yes____. No____.
32. Are tires properly centered on rims before inflating? Yes____. No____.
33. Is spilled oil wiped up promptly and the floor sanded? Yes___. No___.
34. Is care used in operating compressed-air equipment such as hoses and grease guns so that others are not endangered? Yes____. No____.
35. Are students taught the proper way to lift objects? Yes____. No____.



The need for good housekeeping must be emphasized in each operation and in every part of shop.

Some of the items on the check list may seem elementary. Often, however, it is the minor things that are overlooked by both the instructor and the student. Other items may seem to have been omitted. This does not detract from their importance. More comprehensive check lists may be found in the references listed on page 61.

If you put down a lot of "no's" on the check list, it is probably time to review your whole safety program. Despite the rating you gave your shop in your own mind, the results of any evaluation will mean little if nothing is done to make use of the facts uncovered. By quizzing *yourself* at regular intervals you can assess the progress you have made in correcting the physical deficiencies of your shop and in improving your teaching methods.

Students should be taught to take care of themselves. After they get out of school there will be no overseers to lock up machines and look after the routine aspects of safe working procedures. The sooner students are given the responsibility for determining for themselves the measures necessary to prevent loss of life and limb, the better off they will be. Give them the responsibility as early as possible, and then increase that responsibility commensurate with the students' experience and performance. Give them a hand in making their shop a safe place in which to work. Give them responsibility in enforcing the safety rules they help determine.

The student who is individually safety conscious will have an invaluable asset when he enters the workaday world. This aim can be attained only through a well-thought-out and integrated safety program in your shop. All too often when safety is poorly integrated into the program, it takes on the aspect of something that is to be merely learned for the purpose of passing the weekly quiz. Correlation of lectures, lesson plans, demonstrations, visual aids, and individual safety instruction into a sound, integrated program will enable you to accept the responsibility of the safety education of tomorrow's mechanics and carry it out in the most efficient manner possible.

This responsibility is three-fold—to the student—to the parent—and to yourself. If the student leaves your shop with a firm grasp of the basic principles of working safely, you will have fulfilled your obligation toward him. If the student has been protected while under your supervision, you will have fulfilled your responsibility toward his parents. And, if you have expended every possible effort in carrying out the other two obligations, you will have fulfilled your responsibility toward yourself. ★

For special material on shop room and building facilities see *Standards for Automotive Service Instruction in Schools*, AI-VE Conference on Public School Automotive Instruction, 320 New Center Building, Detroit 2, Michigan. It may be obtained free by sending a request on your letterhead. Other general references may be found on page 61.

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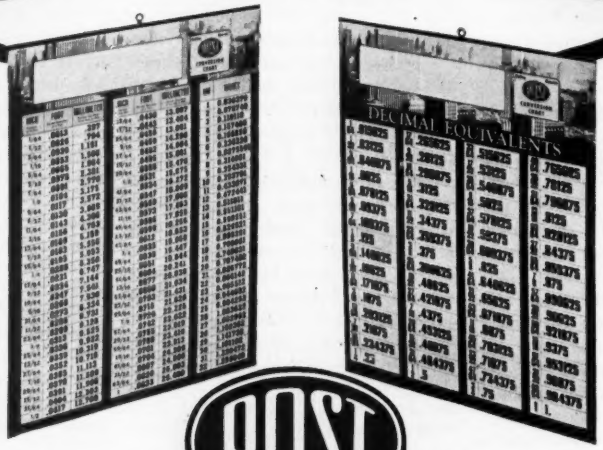

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Safety in the Drafting Room

Hazards occur in the drafting room even though the accident rate is considerably lower than in any other portion of the industrial-education program. Below are some points which drafting teachers should consider to avoid student injury and teacher liability.

DRAFTING teachers have a problem in safety training, albeit less of a problem admittedly than in other school-shop areas where hand and machine tools are more in evidence.

The accidents that occur in the drafting room are usually of the minor variety involving cuts, bruises, and skin perforations. These are potentially dangerous because of the possibility of infection so safety precautions should be a part of the training program.

A hazard of some consequence but one which is not immediately apparent is that involved in eyestrain. Drafting requires constant use of the eyes at very close work. Alert drafting teachers have spotted eye disabilities that were unknown to the student involved. The school and the teacher have a responsibility to see to it that adequate lighting is maintained in the drafting room. In industry this is always considered a major requirement, both from a safety and from an efficiency standpoint. The Illuminating Engineering Society recommends as a minimum standard 50 foot-candles in service measured 30" above the floor. Particular care needs to be taken to see that adequate lighting is provided in those areas in the drafting room which are away from natural lighting.

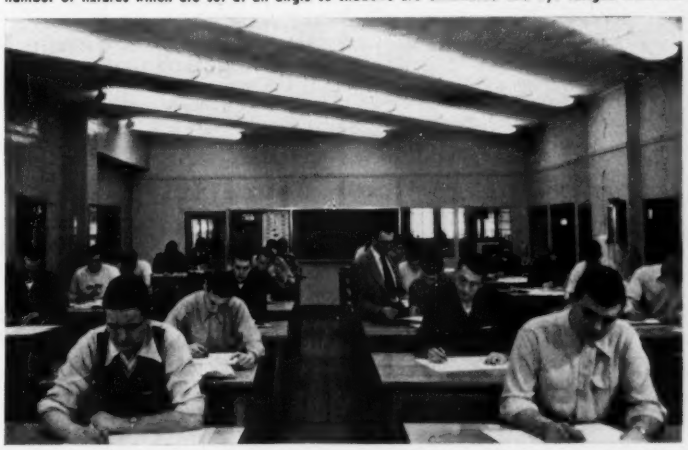
Most of the problems in safety in the drafting room arise because of horseplay on the part of the students or poor housekeeping. Danger arises when exuberant pupils run through aisles, push one another, or wrestle in places where heavy objects may fall on them or they may be injured on sharp objects. Proper housekeeping means that objects that may cause injury are kept in places where this possibility is minimized.

Following is a suggested check list of accident hazards in the drafting room. It is not all-inclusive but will give the instructor an opportunity to make a selfappraisal of his drafting room.

Safety Check List for the Drafting Room

1. Are sharpened pencils stored so that the points do not present a hazard to hands or eyes? Yes_____. No_____.
2. Are pencils sharpened at one end only? Yes_____. No_____.
3. Are compasses stored so that the sharp points do not stick up and present a hazard? Yes_____. No_____.
4. Are dividers with sharp points, and razor blades and scrapers with sharp edges kept in leather or cardboard sheaths when not in use? Yes_____. No_____.
5. Are students warned not to put pencil points in their mouths? Yes_____. No_____.
6. Is the blade of the paper trimmer kept in the locked position when not in use? Yes_____. No_____.
7. Is instruction in the safe operation of the paper trimmer given? Yes _____. No_____.
8. Are India ink bottles held securely on desk tops? Yes_____. No_____.
9. Are drawing boards stored where they will not project into the path of students or fall on them? Yes_____. No_____.
10. Are the dangers of paper cuts made known to students as well as ways of avoiding them? Yes_____. No_____.
11. Do students know how to adjust drawing-desk tops so that fingers will not be injured? Yes____. No____.
12. Are broken or loose seats reported and repaired immediately so that bad falls are avoided? Yes_____. No_____.
13. Are broken thumb tacks removed from drawing boards immediately so that the possibility of hand injuries is lessened? Yes____. No____.
14. Are thumb tacks kept off the floor and furniture and pranks with them prevented? Yes_____. No_____.
15. Is adequate lighting, according to the best recent standards, provided? Yes_____. No_____.
16. Is natural lighting controlled to prevent glare? Yes_____. No_____.
17. Are the electric lights turned on when the day is dark or in the late afternoon? Yes_____. No_____.
18. Is light provided so that it is not reflected into pupils' eyes? Yes_____. No_____.
19. Are electrical connections and cords on printing equipment checked regularly for hazards? Yes_____. No_____.
20. Are rubber gloves and aprons worn when handling toxic chemicals used in printing machines? Yes_____. No_____.
21. Is the electric current turned off and the lamp allowed to cool before changing carbons in the arc lamp? Yes_____. No_____.
22. Are precautions taken to prevent viewing the ultra-violet light emanating from blueprint machines? Yes_____. No_____.
23. Are chemicals used in blueprinting stored safely in stoppered bottles that are placed where they will not be likely to be broken or spilled? Yes_____. No_____.
24. Is there venting of noxious fumes to outside? Yes_____. No_____. ★

Eyestrain, one of the serious hazards of the drafting room, can be avoided by using an adequate number of fixtures which are set at an angle so shadows are eliminated and eye fatigue lessened.



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Safety in the Electrical Shop

Of all the school shops, the electrical shop provides one of the best training grounds for teaching safety. Are you making the most of your opportunities to contribute to your students' safety education in general, and their knowledge of electrical safety in particular? To help you plan your safety program, here is a check list for rating your methods of teaching safety, your shop and its equipment, and some suggestions for implementing your program.

THE layman's high regard for the dangers inherent in electricity is an asset to the electrical shop teacher in impressing on his students the need for working safely. However, the carelessness that is bred with increasing familiarity with a subject is something that must be constantly combated. The short cut in the electrical shop, as elsewhere, soon leads to trouble.

A safety program should begin on the first day the student steps into the shop and continue during each working hour. By making safe working procedures part and parcel of the planning of every job, by developing an eternal air of vigilance in the student, you can contribute to his safety education in general, and his knowledge of electrical safety in particular. The very nature of the subject taught makes the electrical shop one of the most effective instruments of safety education.

A safety program for the student also should be a safety program for yourself; for only when you analyze your own work habits and teaching methods can you be sure that something satisfactory is being reflected by the student. A periodic reappraisal of your methods of teaching safety, of your shop, and of its equipment is one of the most effective means to determine whether or not you are doing your utmost in making your students cognizant of the need for working safely.

One of the best ways in which to do this is to make a check list of the general and specific factors that affect the safety of your students, and then to go ahead and check your shop and your methods against the list. Making up a useful list with which to rate the individual shop requires careful planning if it is to point out all of the weak spots in your safety program. To help you make this periodic inventory of your methods, facilities, and personal attitude toward safety a sample suggestive check list is included here.

Safety Check List

Shop and Equipment

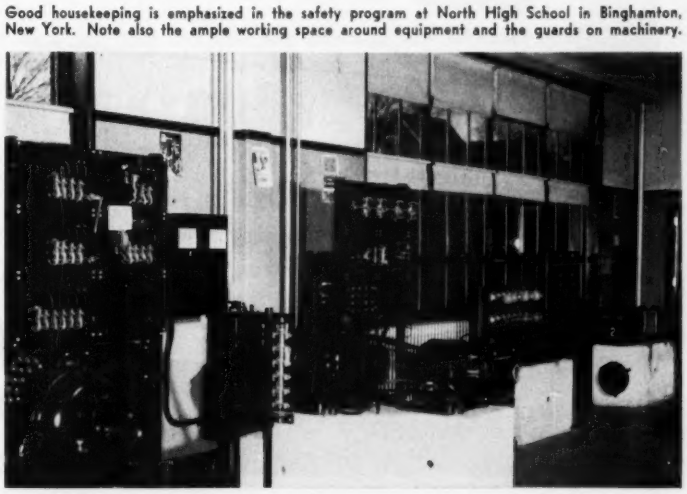
1. Is the amount of temporary wiring kept to a minimum? Yes____. No____.
2. Is permanent wiring well planned? Yes_____. No_____. Is it well constructed? Yes_____. No_____.
3. Have all generators and motors been installed to meet the requirements of the National Electrical Code? Yes_____. No_____.
4. Are all switches and fuse boxes of Underwriters-approved design? Yes_____. No_____.
5. Are all high-voltage and other danger areas well marked? Yes_____. No_____. Are they enclosed? Yes_____. No_____.
6. Are all outlets and lines marked with the voltage they carry? Yes____. No_____.
7. Are a-c and d-c circuits arranged to prevent accidental cross connections? Yes_____. No_____.
8. Is there a first-aid kit available? Yes_____. No_____.
9. Are carbon tetrachloride fire extinguishers provided? Yes____. No____.
10. Are insulated mats, gloves, and tools provided when necessary? Yes_____. No_____. Are they used? Yes_____. No_____.
11. Are tools and equipment kept in good shape? Yes_____. No_____.
12. Is the proper type of test equipment provided? Yes_____. No_____.

Hazard Preventives

1. Is overfusing and overloading always avoided? Yes_____. No_____.
2. Are aisles kept clear of wires and cables? Yes_____. No_____.
3. Are all parts and wires considered "live" until proven otherwise? Yes_____. No_____.
4. Are rings, watches, and other metal objects removed from person before approaching a live circuit? Yes____. No_____.
5. Is "hot" apparatus worked on only under your personal supervision? Yes_____. No_____.
6. Is use of the hands or tools avoided in testing for a current? Yes_____. No_____.
7. Is a double check of all possible results always made before any current is turned on? Yes____. No_____.
8. When a line is worked on, is the main switch locked in an open position? Yes_____. No_____.
9. When making a setup are the line-end leads always connected last? Yes_____. No_____.
10. When taking down a setup are the line-end leads disconnected first? Yes_____. No_____.
11. Are all damaged or frayed wires discarded *at once?* Yes_____. No_____.
12. Are all splices made electrically and mechanically secure? Yes_____. No_____.
13. Are all splices and bare wires prop-

(*Continued on page* 22)

Good housekeeping is emphasized in the safety program at North High School in Binghamton, New York. Note also the ample working space around equipment and the guards on machinery.



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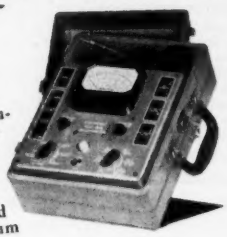

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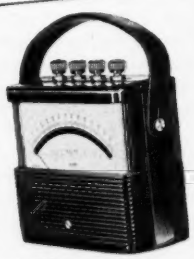

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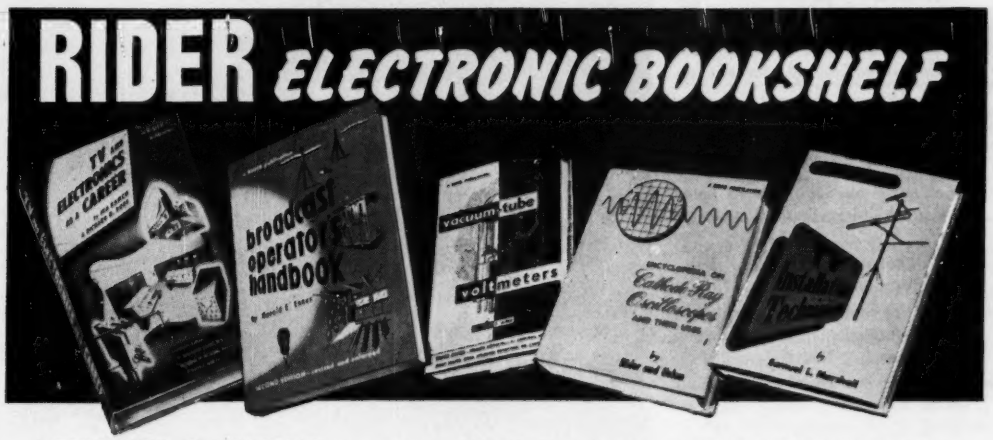
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(*Continued from page* 19)

erly taped? Yes____. No____.

14. Is the Underwriter knot used in making all socket and plug connections? Yes____. No____.
15. Do you personally check all wiring before allowing a student to energize it? Yes____. No____.
16. Does every one in the shop know how to administer first-aid in case of shock? Yes____. No____.
17. Are all burns, no matter how slight, treated promptly? Yes____. No____.
18. Is everyone taught how to rescue a person entangled in a high-tension line? Yes____. No____.
19. Does everyone know the locations of the fire extinguishers? Yes____. No____.
20. Does everyone know how to operate the fire extinguishers? Yes____. No____.
21. Is there a good housekeeping system in effect? Yes____. No____.
22. Are places for all tools and equipment assigned specifically? Yes____. No____.
23. Are wire cuttings and pieces of skinned armored cable kept off the floor? Yes____. No____.
24. Are the devices provided for skinning armored cable always used? Yes____. No____.
25. Is care used in bending conduit? Yes____. No____.
26. Is the current always shut off before making wiring changes in any circuit? Yes____. No____.
27. In working on motors and generators, is the circuit completely de-energized before servicing is begun? Yes____. No____.
28. Is all moving machinery protected by guards? Yes____. No____.
29. Are all power transformers grounded before the circuit is energized? Yes____. No____.
30. Are shirt sleeves rolled down when soldering? Yes____. No____.
31. Are rests provided for hot soldering irons? Yes____. No____.
32. When mixing electrolyte, is the acid poured into the water? Yes____. No____.
33. When electro-plating, are hands kept out of the bath? Yes___. No___.
34. Are acids and cyanides kept out of any possible contact with each other? Yes____. No____.
35. Are the hands washed thoroughly before leaving the electro-plating area? Yes____. No____.

The rules of working safely should be incorporated into the demonstration of each operation. Here, the use of test equipment affords the teacher an excellent opportunity to do this.

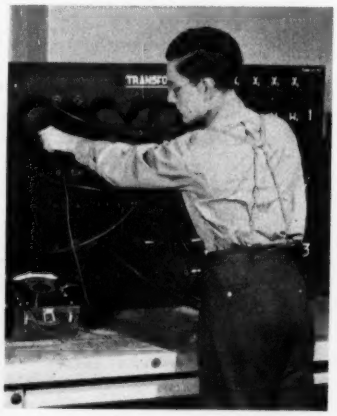
36. Are *all* accidents reported? Yes___. No___.
37. Is there a standard report form? Yes____. No____.
38. Are students instructed to report defective equipment promptly? Yes____. No____.
39. Is your safety program integrated with the other shop work? Yes____. No____.
40. Do you believe your safety program is an effective one? Yes___. No___.

Once the list is made up and checked off, the question arises of implementing your safety program. Often this requires considerable ingenuity. Perhaps budgetary considerations or other seemingly more pressing commitments keep you from giving safety the attention it rightly deserves in your program. It is the little things that escape notice. See if you can replace that temporary wiring—sure it will cost money, and it may require a little cajoling to get it. However, is there a better argument than the safety and well being of your students? Double check the human factors in accident prevention—do your seniors still remember the basic rules of safety to be observed around equipment that they were taught when they were freshmen? It is the end results of your teaching methods that count.

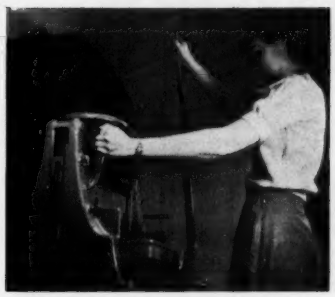
The human factor in accident prevention, in the electrical shop, as elsewhere, cannot be underestimated. The National Safety Council says that fully 90 percent of all school-shop accidents are due to human failure. The other 10 percent are caused by environmental deficiencies such as unguarded machinery. The greatest portion (61 percent) of the accidents due to human failings are caused by taking chances, disobedience of rules, and just plain carelessness rather than ignorance or inexperience. This brings out the fact, that even after the shop and equipment are made safe, the major part of the task remains to be done. Only by continued emphasis on safe working methods as the student progresses and constant refreshing of the basic principles of safety education in your own mind can your program accomplish the job you have set out to do.

You may say of this, "That's been said before." It has, but it bears repeating. Safety bears repeating. If only one student in the class learns one new way of working safely or remembers one that he has forgotten, it is worth repeating. ★

Careful supervision of the work of the individual student following the demonstration will make the safety lesson more effective.



Safety in the Graphic-Arts Shop



Operation of this paper cutter requires two hands so that a common injury can be avoided.

THE graphic-arts department of the industrial-education program presents a distinctive variety of safety problems. Not only are there machines which can be improperly used with serious accidents resulting but there are also dangers from poor housekeeping and work habits because of dust, lead poisoning, and heavy objects.

While the safety record of the graphic-arts shop is generally good, there are enough accidents in schools as well as in industry to make an effective program of safety imperative. Lead poisoning and tuberculosis were the scourge of the printing industry in days past. Proper housekeeping with generous use of the vacuum cleaner will keep down the dust hazard while careful work habits with type kept out of the mouth and of open sores will prevent lead poisoning. Fumes from melting pots should also be vented.

The enlargement of the graphic-arts program to include such areas as offiset work and photography present additional safety problems. Chemicals have to be stored so that they will not spill or give off toxic fumes. Safeguards have to be used in the darkroom so that inexperienced students do not injure themselves or others with broken glass, falling objects, or chemicals.

Lighting is important in the graphic-arts shop so that students do not experience eyestrain or injure themselves or others in shop areas where they cannot see dangerous or heavy objects.

As in most other shops, the pupil-personnel organization for safety is very effective in the graphic-arts shop. Rotating membership with definite duties assigned is the key to a good operating program. The teacher has the responsibility of setting a good example of safe procedure and should demonstrate such procedures when introducing students to new operations. Students should practice safe operations under teacher supervision until the teacher is satisfied that the student can perform the skill with safety.

The following suggestive check list is not all-inclusive but will help the graphic-arts teacher to assess his program and make changes in the interest of having a safer shop.

Safety Check List for Graphic Arts

General

1. Is the lighting adequate so that pupil eyestrain is avoided and work areas, particularly around presses and other machinery, receive plenty of light? Yes____. No____.
2. Are dangerous operations on a voluntary basis so that pupils may be excused from them with the instructor's approval? Yes____. No____.
3. Are approved fire extinguishers in good working order provided? Yes____. No____.
4. Are rags saturated with flammable liquids always kept in approved self-closing containers? Yes____. No____.
5. Are flammable liquids stored in self-closing approved containers? Yes____. No____.
6. Is the shop kept clean with equipment and supplies in order? Yes____. No____.
7. Is a properly stocked first-aid cabinet available? Yes____. No____.

Composing Room

1. Are students aware of the danger from lead poisoning if they hold type, spaces, or ornaments in their mouth? Yes____. No____.
2. Are forms stacked on the floor in places where they create stumbling hazards? Yes____. No____.
3. Are type cases and galleys kept where they will not protrude and create hazards? Yes____. No____.
4. Do students keep their hands off the track and ends of the proof press? Yes____. No____.
5. Is care used in the handling of forms with rules or sharp edges to avoid hand and finger cuts? Yes____. No____.
6. Do students except the operator stand away from the line-casting machine when it is in use? Yes____. No____.
7. Do student operators know how to operate the line-casting machine safely? Yes____. No____.

Pressroom

1. Is only one student at a time allowed to operate a job press? Yes____. No____.

The graphic-arts area of the school shop offers many hazards to the student but most of them can be avoided if care is used by the teacher. Here is a check list of selected items you can use to measure the effectiveness of your safety program.

2. Are tools kept off the feed or job board? Yes____. No____.
3. Is the press stopped when being inked? Yes____. No____.
4. Is the power shut off when the press is left idle? Yes____. No____.
5. Is the press stopped if left unattended if even momentarily? Yes____. No____.
6. Are safety guards left on the press? Yes____. No____.
7. Is the power always turned off before forms are put on the press? Yes____. No____.
8. Is care used in opening ink cans to prevent cuts? Yes____. No____.
9. Do students get help when lifting heavy forms? Yes____. No____.

Bindery

1. Are paper cutters used that require both hands on the handle or controls? Yes____. No____.
2. Is but one student at a time allowed to work at the paper cutter? Yes____. No____.
3. Is the cutter blade locked when the cutter is not in use? Yes____. No____.
4. Are fingers kept away from the movable parts of the stitcher? Yes____. No____.
5. Is loose clothing avoided when operating the folder? Yes____. No____. ★

Student does not reach in operating press to recover unregistered sheet. Note wheel guards.

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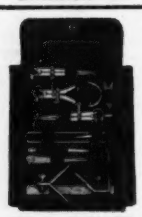
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Safety in the Metal Shop

Hand tools are involved in two-thirds of the accidents in the general metal shop with machines having a part in the other third. The check list herewith will help the shop teacher make an appraisal of the accident hazards in his shop so that he can protect the pupils and himself by using the proper precautionary measures.

THE general metal shop is a place where activities are being carried on which are drawn from a number of different metal trades. Among these may be found machine-shop work, sheetmetal work, foundry work, and bench-metal work.

While all these are related, in that metal is the material used in all of them, wide differences in the equipment and methods used appear quite frequently. This fact complicates the task of the teacher, and increases for him the problems of supervision. Not only is this so but this type of work is offered most frequently on the junior-high-school level which means that the pupils are apt to be from the younger age group.

All of these conditions increase the tendency for accidents since the teacher has so many factors calling for his attention. Because of this, the problem of developing safe working habits in the pupils becomes particularly difficult.

In order to assist the teacher in checking safety conditions in his shop the following check list is presented. It is far from being complete, but it suggests the type of instrument which will keep before the teacher the precautions that need to be observed in a general metal shop. With such a check sheet at hand, the teacher can check on conditions in the shop at intervals, and be reminded of steps he might take to improve them.

Metalworking Shop Check List

Machines

Suggestions concerning machines usually found in a machine shop will be found in the section devoted to machine-shop work on page 31 of this issue.

Welding

1. The careful welder wears woolen clothing, which has no pockets or folds where sparks may lodge. Yes____. No____.
2. Gauntlet gloves are worn by the operator who is engaged in welding. Yes____. No____.
3. Trousers with cuffs are not worn when welding. Yes____. No____.
4. High shoes are worn to reduce the danger from falling sparks. Yes____. No____.
5. Goggles are worn constantly when welding. Yes____. No____.
6. Shields are worn when welding to protect the face of the operator. Yes____. No____.
7. In view of the high voltage used in electric welding equipment the welder wears dry gloves and works on a nonconductive floor. Yes____. No____.
8. All transformers are adequately grounded. Yes____. No____.
9. In order to aid in ventilation, dividing partitions are at least two feet from the floor. Yes____. No____.
10. Exhaust hoods are installed in all permanent booths. Yes____. No____.
11. Good housekeeping is insisted on to minimize the danger of fire. Yes____. No____.
12. No flammable material is permitted in the area where welding is being done. Yes____. No____.
13. Since grease and oil are flammable, they are not used on the fittings of the oxygen supply. Yes____. No____.
14. Nonsparking wrenches are used to tighten or remove container or hose fittings.
15. Leaky tanks are removed from the building at once and vented. Yes____. No____.

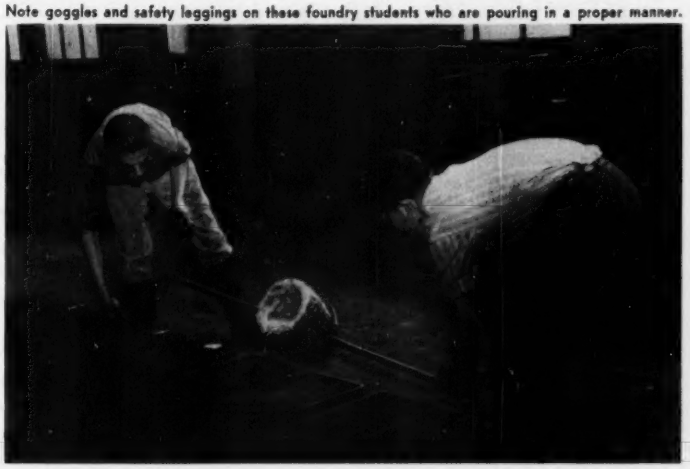
Foundry

1. Gauntlet gloves are used when pouring metal. Yes____. No____.
2. Specially designed protective shoes and leggings are provided for pupils who have to pour metal. Yes____. No____.
3. Pupils are required to wear goggles when chipping castings, operating sand-blast equipment, or when handling molten metal. Yes____. No____.
4. Emery wheels are trued up at frequent intervals. Yes____. No____.
5. Pupils are forbidden to use hammers with loose heads. The hammers are laid aside to be repaired. Yes____. No____.
6. The aisles in the foundry are kept clear to minimize the accident hazards. Yes____. No____.
7. Pupils are aware of the danger attached to throwing wet scrap into molten metal. Yes____. No____.
8. It is standard practice for pupils to stick their shovels in the sand when not in use. Yes____. No____.
9. Care is taken in mixing sand because when it is too wet it may cause the mold to blow. Yes____. No____.
10. Pupils are aware of the consequences of attempting to lift heavy loads. Yes____. No____.

Forge

1. The handles on all tools are tight. Yes____. No____.
2. All hammers, chisels, punches, and hot-cutters are kept well dressed to avoid flying chips. Yes____. No____.
3. The hardening of the heads of cold chisels, punches, or similar tools is forbidden. Yes____. No____.
4. Hot metal is always kept in a safe place. Yes____. No____.
5. All flammable materials are kept

Note goggles and safety leggings on these foundry students who are pouring in a proper manner.



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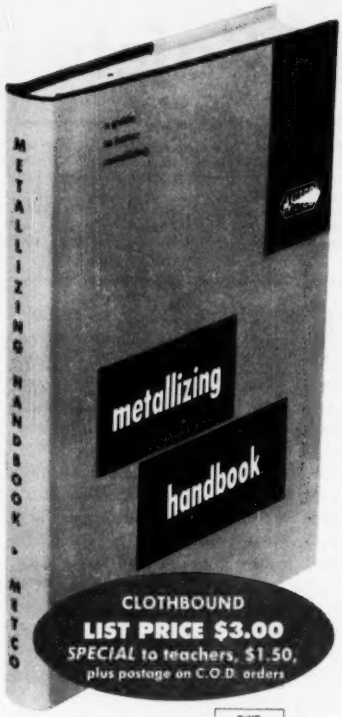

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- Inside Diameter and Flat Surfaces
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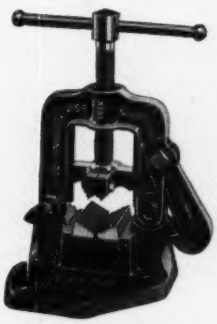

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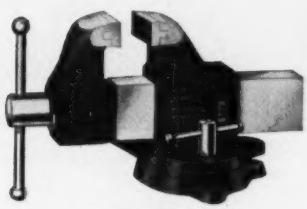

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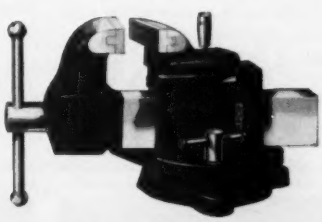

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away from the area of the forge. Yes____. No____.

6. Care is exercised in handling long pieces of steel as carelessness may endanger the safety of others. Yes____. No____.
7. Case-hardening with cyanide produces noxious fumes so pupils are cautioned to avoid inhaling them. Yes____. No____.
8. Proper clothing is worn by all pupils as the presence of pockets or trouser cuffs presents a hazard from hot sparks which may fall from the work. Yes____. No____.
9. Pupils are warned not to gaze into a hot fire for an extended period of time. Yes____. No____.

Sheetmetal

1. The squaring shears are not used without the permission of the teacher. Yes____. No____.
2. The shears are kept locked when not in use. Yes____. No____.
3. Only one person may work at a time on the squaring shears or bar folder. Yes____. No____.
4. All gears on the forming rolls are properly guarded. Yes____. No____.
5. The operator keeps his fingers away from the forming rolls. Yes____. No____.
6. The operator feeds the work carefully so that his fingers will not follow the work into the rolls. Yes____. No____.
7. The operator of the bar folder makes sure that everyone is far enough away to avoid being hit by the handle as it descends. Yes____. No____.
8. The operator of the bar folder removes his hands as soon as the work is in the machine. Yes____. No____.
9. Scraps of tin or galvanized iron are removed from the bench with a brush. Yes____. No____.
10. The edges of sheetmetal are sharp so pupils handle it with care. Yes____. No____.
11. The operator of the shears does not attempt to cut hardened steel. Yes____. No____.

Student buffing convex surface well below horizontal axis of wheel. Note that he wears safety glasses and his sleeves are rolled up. The buffer also has adequate guards around wheel.

Bench Work

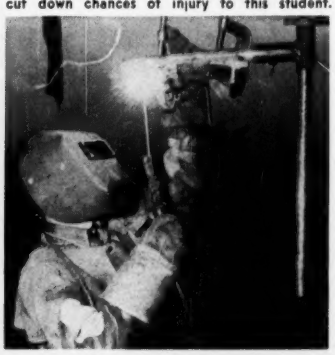
1. Vises are kept closed when not in use. Yes____. No____.
2. Stock which projects from the vise is removed when the operator is not present to watch it. Yes____. No____.
3. Mushroomed tools are dressed before they are used. Yes____. No____.
4. Pupils do not carry sharp tools in their pockets. Yes____. No____.
5. The right tool is always selected for each job. Yes____. No____.
6. Hammers with loose handles are set aside immediately to be repaired. Yes____. No____.
7. Wrenches that are sprung are unfit

(*Continued on page 59*)

Individual, well-ventilated booths and master switching system make for safe welding practice.

Student has cold chisel in firm grip and safety shields are in position. Wheel is well guarded.

Face shield, gauntlets, and protective jacket cut down chances of injury to this student.



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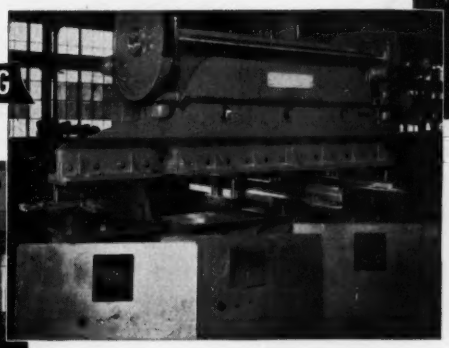

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Safety in the Machine Shop

Safety is a cooperative enterprise in the machine shop with teacher and students agreeing on and understanding safe practices. The check list below will be helpful in setting up and appraising safe practices in one of the more hazardous areas of industrial education.

INDUSTRY has recognized the seriousness of the accident problem, and industrialists have expended considerable effort to develop a safety consciousness in the minds of their workers. This is particularly true in the metal-processing division where so many power machines are in use.

This concern on the part of industry must be shared by the school since it has the responsibility of preparing young people for intelligent participation in the activities of life, which include occupational activities.

One of the more common of the occupational areas represented in school is the machine shop. Teachers who are responsible for this type of training should make a definite effort to inculcate in the minds of their pupils the principles of safety procedure which will apply when they enter industrial employment.

One of the specific responsibilities of the shop teacher is the maintenance of safe working conditions and safe work practices in the area in which he teaches. Then, too, he must provide adequate instruction in safety for his pupils. He must foster pupil cooperation in policing the shop to the end that safety procedures are followed at all times.

Safety instruction should be active and positive and, wherever possible, should involve real situations. In addition, there should be constant supervision of pupil safety activities by the teacher.

The task of the teacher will be simplified if there is a common code of safety rules developed for each shop so that the pupils and the teacher may have a common understanding of the requirements by all who work in the shop.

The following list is presented as a suggestion of a few of the items that might appear in a code for machine shops. Other items would have to be added to make it of use in a particular shop. When it is complete, this list could be used by the teacher in checking on the conditions prevailing in his shop and it would reveal to him the points at which improvements have to be made.

Machine Shop Safety Check List

General

1. Machines may not be operated without permission from the teacher. Yes____. No____.
2. The working area around each machine is defined by a red line about 2" wide. Yes____. No____.
3. Only the operator is permitted within the working area around the machine. Yes____. No____.
4. It is standard practice to avoid wearing loose clothing, long sleeves, or ties. Yes____. No____.
5. It is accepted that the school shop is a place to work, so pupils refrain from clowning or playing while the class is in session. Yes____. No____.
6. Safety guards are provided on all machines and pupils are expected to use them at all times. Yes__. No__.
7. All tools are removed from the machines before the power is turned on. Yes____. No____.
8. Clamps are securely fastened before the machine is started. Yes__. No__.
9. If a machine gets out of adjustment, it is reported to the teacher at once. Yes____. No____.
10. Pupils recognize the danger attached to distracting the attention of an operator while the machine is running. Yes____. No____.

Drill Press

1. Pupils are required to wear goggles at the machine. Yes____. No____.
2. A brush is used on all occasions to sweep steel chips from the job or machine table. Yes____. No____.
3. Stock to be drilled is secured to prevent it from turning after the power is turned on. Yes____. No____.

(*Continued on page* 33)

Safety glasses are worn by both student and instructor. The work is securely clamped to the table which is clean and uncluttered. The operator's sleeves are rolled up to avoid catching.

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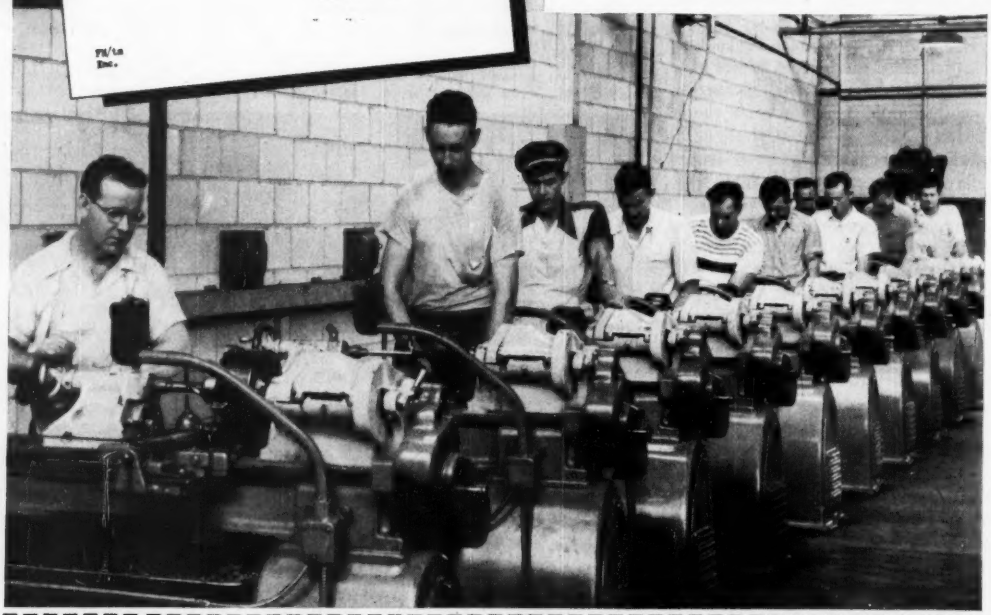

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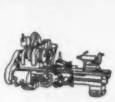
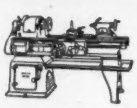
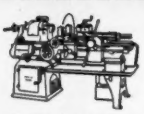


☐ 9" and 10" BENCH LATHES

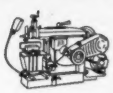


☐ 10" to 16-24" FLOOR LATHES



☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES



☐ 7" BENCH SHAPERS

Name _____ School _____

Street _____ City & State _____

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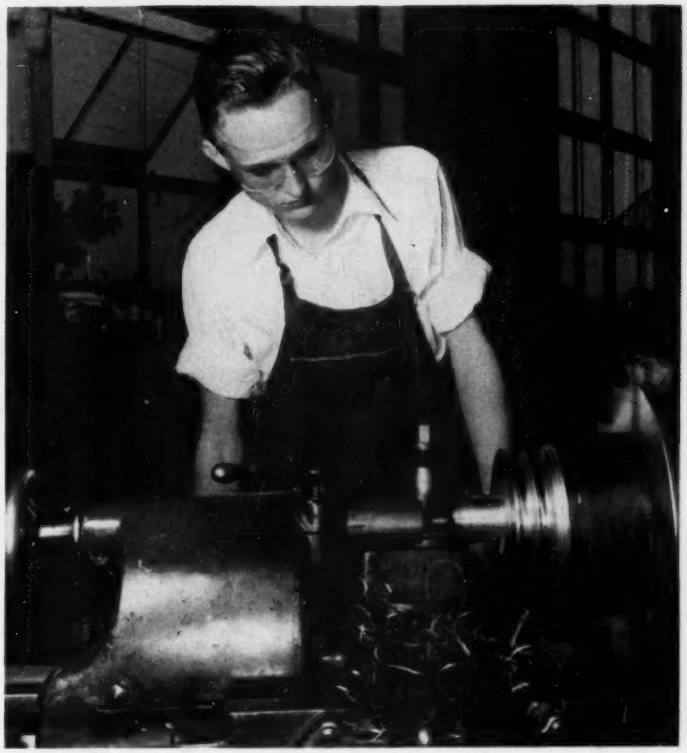
4. The operator stands erect with his head high when the drill is in motion. Yes____. No____.
5. Drills that are dull are set aside to be sharpened. Only sharp drills are used. Yes____. No____.
6. The operator must be dressed appropriately before he is permitted to use the machine. Yes____. No____.

Lathe

1. Sleeves are rolled up before the machine is started. Yes____. No____.
2. When the operator wishes to talk with someone, he stops his machine. Yes____. No____.
3. The machine is stopped when measuring has to be done. Yes___. No___.
4. The tool-holder and tool-post are removed when filing or polishing is being done. Yes____. No____.
5. When turning between centers, the tailstock center is properly lubricated before the machine is started. Yes____. No____.
6. The tailstock is securely fastened before the machine is started. Yes____. No____.
7. A light cut is taken when the stock is long in order to prevent the job from springing. Yes____. No____.
8. When doing chuck work, the piece is gripped firmly in the chuck. Yes____. No____.
9. Safety zones around the machines are plainly marked. Yes___. No___.
10. The chuck wrench is removed from the chuck before the power is turned on. Yes____. No____.
11. Power is never used to remove the chuck. The machine is stopped and the power switch pulled. Yes____. No____.
12. Before starting, the spindle is turned by hand to make sure that everything is clear. Yes____. No____.

Milling Machine

1. All automatic feeds and table locks are released before leaving the machine or setting up for a new job. Yes____. No____.
2. The machine is stopped before making adjustments. Yes____. No____.
3. A soft hammer is used when seating the work against the parallels. Yes____. No____.
4. The operator assures himself that the job is securely fastened before taking a cut. Yes____. No____.
5. Cutters are sharp so the operator uses a rag to protect his hands when handling them. Yes____. No____.
6. Spindle speeds are not changed while the machine is in motion. Yes____. No____.



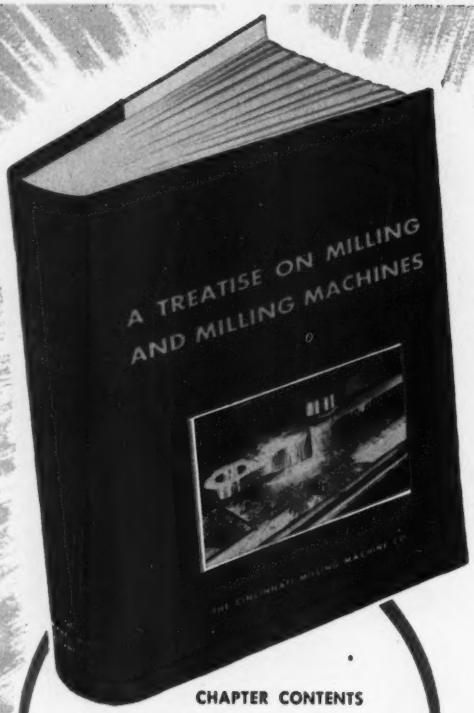
This student lathe operator is wearing safety goggles and no loose clothing will catch in the lathe as his sleeves are rolled and he wears no tie. The wrench has been removed from the post.

7. The spindle nut is never removed or tightened by machine power. The power is turned off and the adjustment made by hand. Yes___. No___.
8. The operator assures himself that the cutter is running in the proper direction, and at the correct rpm. before engaging the feed. Yes____. No____.
9. Each set-up is checked by the teacher before starting the machine. Yes____. No____.
10. When the machine has been set for the proper depth of cut, all handles are placed in a neutral position and all safety stops are set. Yes____. No____.
11. A brush or wooden paddle is used to remove chips from the machine. Yes____. No____.
12. Oil or cutting compound is not permitted to accumulate on the floor. Sawdust is spread around to absorb the hazard. Yes____. No____.
13. Rags or waste are not used near revolving cutters. Yes____. No____.
14. The operator releases all automatic feeds when he has finished using the machine. Yes____. No____.

Shaper

1. Goggles are worn when operating this machine. Yes____. No____.
2. Before the power is turned on, the ram is run forward and back by hand to insure that the tool head clears the work and the machine. Yes____. No____.
3. The operator assures himself that the ram clamp is tightened, the vise is fastened securely, and the stroke and feed are properly set before turning on the power. Yes___. No___.
4. All adjustments are made when the machine is at a complete stop. Yes____. No____.
5. Changes in speed are made only when the power is off. Yes___. No___.
6. Each set-up is checked by the teacher before the power is turned on. Yes____. No____.
7. The operator keeps away from in front of the ram when the machine is in motion. Yes____. No____.
8. The machine is stopped when the work or the machine needs to be checked. Yes____. No____.
9. The machine is stopped on every

(*Continued on page* 35)



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CHAPTER CONTENTS

CHAPTER 1	The Milling Machine
CHAPTER 2	Milling Machine Accessories
CHAPTER 3	Milling Cutters
CHAPTER 4	Milling Cutter Materials
CHAPTER 5	Milling Cutter Elements
CHAPTER 6	Sharpening and Care of Milling Cutters
CHAPTER 7	The Milling Process
CHAPTER 8	Chip Formation, Surface Finish, and Cutting Fluids
CHAPTER 9	Power Required in Milling
CHAPTER 10	Mounting of Milling Cutters
CHAPTER 11	The Milling Machine in Toolroom Work
CHAPTER 12	The Use of Work Indexing in Repetitive Milling Operations
CHAPTER 13	Milling of Helical Surfaces
CHAPTER 14	Milling Cams and Other Surfaces of Curved Contour
CHAPTER 15	Milling Dies, Molds, and Parts of Cylindrical or Irregular Contour
CHAPTER 16	Diversified Uses of Milling Equipment in Toolroom Work and Inspection
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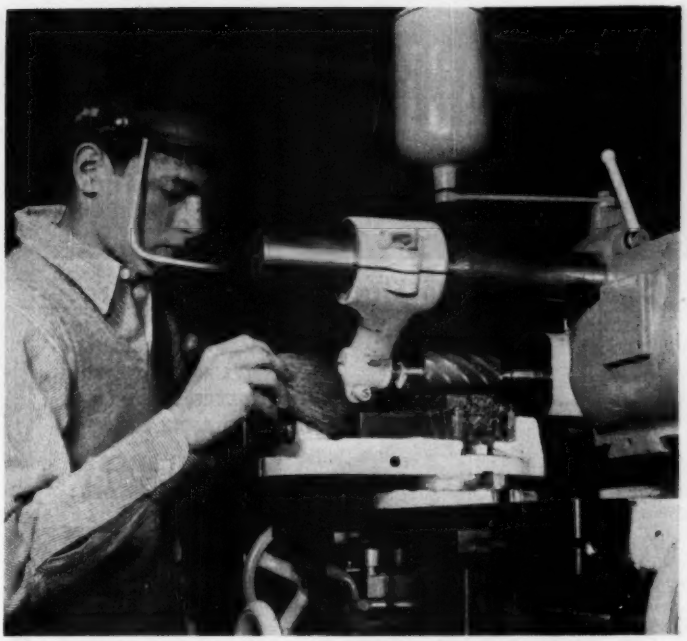
occasion when the operator has to leave it. Yes____. No____.

10. The operator checks with the teacher to insure that he uses the right tool. Yes____. No____.

Grinder

1. Goggles must be worn when working at a grinder. Yes____. No____.
2. The rest is never farther from the wheel than ⅛" when grinding. Yes____. No____.
3. The machine is always stopped when the rest has to be adjusted. Yes____. No____.
4. Pupils never use the side of the wheel when grinding. Yes___. No___.
5. The operator never stands in front of the wheel when starting it. Yes____. No____.
6. Articles to be ground are held by hand; the use of pliers or tongs is forbidden. Yes____. No____.
7. The face of the wheel is kept true and in perfect balance. Yes___. No___.
8. All wheels are properly guarded. Yes____. No____.
9. A wheel on which wet-grinding is done is never left immersed in water as the water-soaked portion will throw the wheel out of balance. Yes____. No____.
10. Care is taken to avoid excessive pressure on the wheel as this may result in overheating and cause breakage. Yes____. No____.



"It's easy to forget . . . especially safety rules." This student has remembered to wear his safety mask and to use the whisk broom to clean up, but forgotten to roll up his sleeves.

The points made above apply to the operating and care of equipment. However, much may be done to minimize the hazards that are common to machine shops by anticipating these hazards when the layout of the department is being planned.

In the first place, ample space should be allowed for each machine in order that the operators may not get in the way of one another. When deciding on the amount of space necessary for a machine, some provision should be made for the piling of stock being processed.

When possible, the operator should face the aisle. If it becomes necessary for him to work next to an aisle, it is good practice to have him protected by a rail or some similar barrier.

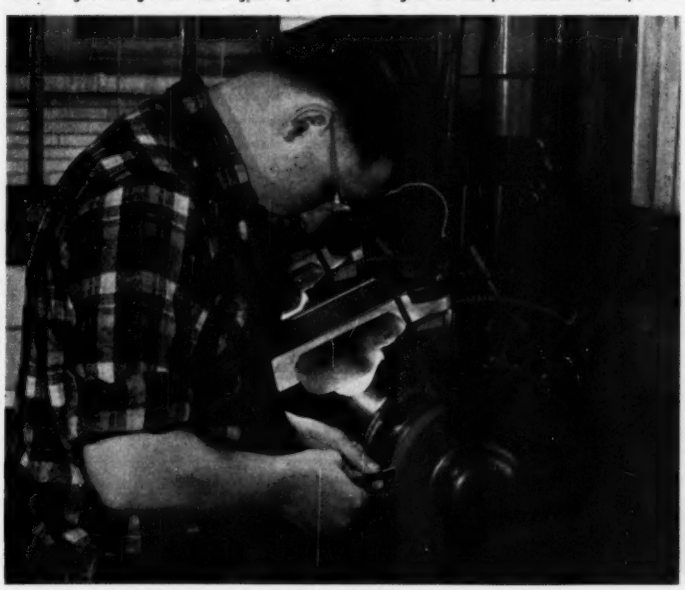
Again, when placing a shaper or planer, clearance should be provided between the limit of the back stroke and the wall. This will remove the hazard of someone being crushed against the wall.

Another point which must be thought of is the placing of the machines so as to make full use of whatever natural light there is available.

Storage for bar stock should be in a manner which minimizes heavy lifting and it should be located in close proximity to the power saw. By this means the hazards of carrying bars through the shop and past machine operators will be avoided.

If possible, grinders should be placed in positions which keep the rotation of the wheel out of line with the operators of other machines. If this is done and a wheel should break, the danger to other pupils will at least be lessened. ★

This well guarded grinder has a glass eye shield with lights for the protection of the operator.



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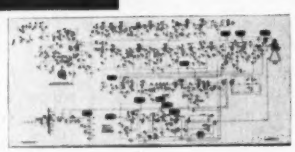
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Safety in the Radio Shop

Radio shops present many of the same hazards that are found in electrical shops. The high voltages found in modern electronic equipment create an added problem in safety education for the radio-shop teacher. Listed here are a few of the elements of "safe thinking" that should be observed in the radio shop, together with some ideas for carrying them out.

RADIO shops have many of the same safety problems that are found in the electrical shop. Similar hazard preventives can be used with beneficial effect in both areas. Electronics, however, presents many hazards that are not found in the general electrical shop. High-frequency circuits and high voltages offer their own problems.

The soaring demand for well trained electronics technicians, both in and out of the armed forces, will put an increasing pressure on the schools to turn out graduates at a more rapid pace. The increasing complexity of equipment calls for an expanded curriculum. The old-fashioned radio shop has given way to a scientific laboratory staffed with skilled technicians.

Safety training needs have also become increasingly complex. Adding up of the pressures exerted on the teacher may result in an almost unavoidable "hurry-up" if his students are to cover the ground that is expected of them. In an accelerated program perhaps the students' safety education will tend to be slighted, not purposely, but by being inadvertently relegated merely to routine consideration.

The radio shop graduate in many cases goes out to work in a small shop or to set up a business of his own. The extent of his safety education is largely determined by what you can give him. If his safety consciousness is well developed, a student will endeavor to keep his safety knowledge abreast of his technical skill after he leaves school. Instinctively, he will look for the safe way of tackling a job despite the lack of formal supervision. A thorough knowledge of the basic rules of working safely will give the student the sound background he needs in order to expand his safety knowledge on his own.

By applying the check list method, as suggested for the electrical and other shops, you can outline a program that will indoctrinate the habit of "safe thinking" in your students. Keeping up with the safety rules to be followed in servicing the multitude of electronic devices, as well as the judicious repetition of the basic precautions to be observed, will enable you to make safety an integral part of your over-all program.

Following is a suggested check list of safety practices that can be adapted to your particular shop situation.

Check List

1. Are receivers unplugged from the line before any repairs are attempted? Yes____. No____.
2. When using an ohmmeter is a double check made to see that the power is off? Yes____. No____.
3. Are the chassis of a-c—d-c radios kept clear of grounded conductors? Yes____. No____.
4. Is the workbench kept clear of tools and loose wires? Yes____. No____.
5. Is all work securely clamped in a vise before drilling or punching is attempted? Yes____. No____.
6. Is only one hand used when it is necessary to work on live circuits? Yes____. No____.
7. Are test prods handled with care to avoid shocks? Yes____. No____.
8. Are hands always kept clean and dry? Yes____. No____.
9. Are hot soldering irons handled with care? Yes____. No____.
10. Are screws, nuts, and bolts with worn slots or rounded corners replaced? Yes____. No____.
11. Are amplifier dust pans or cover grills removed only after power is thrown off? Yes____. No____.
12. Are all ground wires kept secure? Yes____. No____.
13. Is the cutting of live wires always avoided? Yes____. No____.
14. When storage batteries are being charged, are they kept away from open flame? Yes____. No____.
15. Is the blocking of cabinet safety switches strictly forbidden? Yes____. No____.
16. Is safety emphasized in introducing each new operation? Yes___. No___.
17. Are students reminded of safety rules periodically to keep them from getting careless? Yes____. No____.
18. Are fuses pulled only with the appropriate tools? Yes____. No____.
19. When servicing TV sets, is the *cord plug* pulled out before any work is undertaken? Yes____. No____.
20. Are *all* capacitances discharged before any work is attempted on high-voltage circuits? Yes____. No____.
21. Is the body kept away from high-voltage circuits in TV sets when they are operating? Yes____. No____.
22. Is a spring clip instead of an ordinary test prod used to connect voltmeters or other measuring instruments to high-voltage circuits? Yes____. No____.
23. If hand-held prods must be employed, are they insulated for the voltages present? Yes____. No____. Do they have finger guards? Yes____. No____.
24. In removing a picture tube, are shatterproof goggles, heavy gloves, and enough clothing to protect the arms and body worn? Yes____. No____. Are bystanders kept at a safe distance during the operation? Yes____. No____.
25. Are metal tools kept away from the picture tube? Yes____. No____.
26. Is care used to prevent the tube, especially the neck, from bumping against anything when removing it from the chassis? Yes____. No____.
27. Is the tube protected from large and sudden changes in temperature? Yes____. No____.
28. Is care used to avoid forcing the tube into position when re-installing it? Yes____. No____. ★

Safety education in the radio shop, as elsewhere, should begin with elementary operations and be continued as the student progresses.

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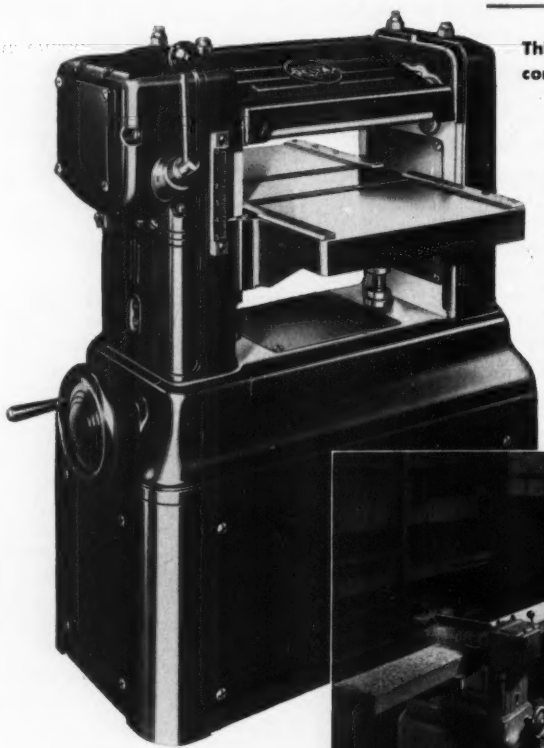

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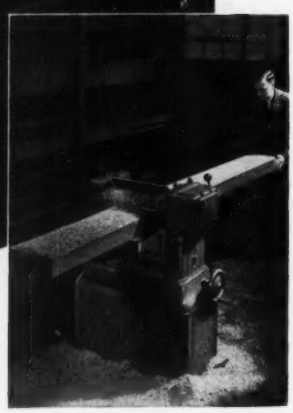

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Safety in the Wood Shop

More accidents occur in the woodworking shop in the school than in any other area. Part of this record is due no doubt to the fact that woodworking is one of the most popular of all shop activities, but the hazards of sharp tool edges and fast-moving equipment with keen cutting parts is also responsible. Proper safety precautions can prevent a majority of these accidents and the following check list will help the shop teacher to carry out a positive program of safe operation of this equipment.

MANY of the precautions to be taken in a school woodworking shop are common to other types of work. However the suggestions made in this section are intended to apply in situations in which edge tools are used, and where dangerous machines, running at high rpm, constitute an important part of the regular equipment.

One of the most important responsibilities of the teacher is to impress on his pupils that they are members of a team. Each member of a team should have the welfare of his teammates in mind at all times. If one member of the team is injured, it follows that the team is one man short. This places on the other members the responsibility of carrying his load in addition to their own. This is true in sports, it is true in industry, and it is true in most other activities in life. If this general principle can be instilled into the minds of the pupils, there is a possibility that they may recognize its application in the school shop.

Before we can justify emphasizing safety practices in the school shop we must, first of all, assure ourselves that the environment in which the pupils have to work is as safe as it can be made by using every modern safety device approved by qualified safety engineers. This is primarily the responsibility of the teacher, although it is recognized that he is not always in a position to obtain all he might desire.

No teacher can afford to, nor would he wish to, expose his pupils to a hazard of which he is aware. As a matter of fact the conditions which hold him liable for injury to his pupils in most states would justify his refusing to permit his pupils to work under conditions where a hazard is known to exist. Obviously the teacher is not in a position to take issue with his superintendent, but he cannot avoid the responsibility of recognizing hazards, and bringing them to the attention of his superiors. When he does this it should be in writing, properly dated, in order that he may be in a safe position in the eyes of the law should an accident occur.

Woodworking machines are always a potential source of danger. This is particularly true if effective guards have not been installed. For this reason, when a machine is being purchased, the teacher must assure himself that the specifications include a clause requiring that the machine be adequately guarded in accordance with standard practice. If a machine is delivered which lacks these guards, the administration should be informed at once in writing. Furthermore, the pupils should be barred from using it until reasonably safe conditions are provided. This will tend to protect the pupils, but it will also eliminate any blame which might be placed on the teacher.

Since the responsibility for accidents in the school shop rests with the teacher in most cases, he can check his procedure against the suggestions which follow. It is not expected that any one teacher would earn a perfect score on these. It is believed, however, that the mere act of checking will reveal to him the points in which his practice is unsound. Having once recognized the weakness in his shop it is easy for him to do something about it.

The practice of selfevaluation is a profitable one, and need not be embarrassing, since the person being checked is the only one who knows the results. It is a form of insurance that costs little and reveals much.

The following items to be checked have been selected at random, and are merely suggestive. A more complete list might be prepared by a committee com-

(Continued on page 48)

Hazards in the use of the jointer can be avoided by use of a "pusher," rolling up the sleeves to avoid catching in the cutterhead, keeping both hands away from the danger area, and standing on nonskid safety mats which should be provided around all such machinery to prevent slipping.

THE SAW THAT WAS DESIGNED WITH THE SCHOOL SHOP IN MIND

THE BOICE-CRANE 14" BAND SAW

VERSATILITY . . cuts, sands, grinds any material . . accurately . . smoothly.

SPEED . . 2 to 4 times faster. Blade speed up to 4,100 f.p.m. at 1200 r.p.m. Vibrationless.

CAPACITY . . blade to guard, 13-1/2", 27" dia. work. Guide to work table, 7-3/4". Blade widths: 3/16", 1/4", 3/8", 1/2", 3/4". Blade length: 98".

SAFETY . . wheels and blade entirely enclosed, except at cutting point. Blade guides safely adjusted by single control, even when running.

SIZE . . overall height of floor model: 67". 15" x 15-1/2" table tilts on double trunnions. Sealed-off motor compartment in cabinet base.

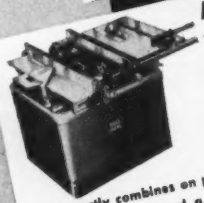
STURDINESS . . strong, one-piece, welded steel frame. Completely balanced, strong, light, molded Textolite wheels; dia.: 14"; face, 1". Long-life, grease-sealed ball bearings.

12 MODELS Single and 8-Speed Backgeared.

A "COMPLETE WORKSHOP"

—It Cuts, Mitres, Planes, Rabbets, Grooves!

Only Boice-Crane Makes a SAW-JOINTER WITH A TILTING-ARBOR SAW!



Compactly combines on portable, welded steel cabinet stand the 10" tilting-arbor saw and a 6" jointer driven by one, rather than two motors. Both machines can be used simultaneously. The longer table and fence guarantee perfect work on longer stock than usually can be handled on 6" jointers. The jointer planes and rabbets 1/2" deep.

ONLY BOICE-CRANE HEAVY DUTY JIG SAWS Give You All These Advantages

The only 24" jig saw that cuts materials up to 5" thick and accommodates blades 5" to 9" long.

Wider range tensioner correctly tensions tiny 1/16" fret blades up to heavy duty 1/2" blades for metal to guarantee a square face or plumb curve and prolong blade life. Blades may be turned 90° for ripping long stock. Two adjustable blade guides.

50% longer blade stroke (1-1/2").

Super-strength guide and smooth piston action for fast, accurate, clean contour and straight cutting, inserted blade work, die filling, saber sawing and sanding.

Oversize, precision ground, highly polished cast iron work table (20" x 20") tilts 45° two ways.

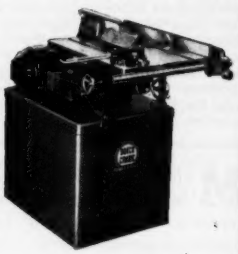
Splash lubrication. Ball-bearing crankshaft. Powerful dust blower.

Overall: 39" high, 20" wide, 38" deep.

WHAT ARE THE MOST IMPORTANT THINGS ABOUT A SAW?

Capacity, durability and precision, we believe you will agree. That's why extra capacity, unusual sturdiness and real precision have been built into the

BOICE-CRANE 10" TILTING-ARBOR SAW



Square off work up to 13 inches wide in front of the blade without costly front extensions, necessary with other saws, and which still leave you with a light weight, inaccurate machine.

Precision is MACHINED into every part. Important parts, such as the ripping gauge, aren't stamped out, pressed out, or die cast, but MACHINED FOR ACCURACY. The 28" cast iron rip fence is precision ground both sides. Large trunnions assure super-accurate saw blade alignment. Gauges are accurate, easy to read.

The 3/4" arbor is the largest, and the bearings the heaviest of any 10" saw. Heavy overloads handled with ease.

The only 10" saw which can be driven by low cost standard motors or lineshaft by using our exclusive Rolling Drive Pulley. The motor is entirely separate from machine and away from dust, keeping vibration from the arbor, eliminating needless wear on trunnions and slide ways. It stays accurately locked in any position. Powerful V-belt drive transmits up to TWO H.P.

Fence aligned as it micro-sets, increasing safety by making it unnecessary to reach over the blade to set or adjust. Secure, accurate alignment on first lock-up. One-knob, lightning fast, automatic control of both front and rear locks. Conveniently grouped controls for quick, accurate tilting, raising and lowering of saw blade. Positive locks.

Fine miter-gauge, with patented plunger setting and adjustable stops for 45° and 90°. Ribbed steel splitter prevents binding. Anti-kickback feature. Approved safety guard hood shields entire saw blade, tilts with blade. Large dust chute encloses lower portion of blade, discharges saw dust away from motor. Table: 20" x 27". Saw Blades: 10" dia. max.—Dado Heads 6" dia. x 1-1/16" wide. Depth of cut: Saw Vertical 3"; Saw Tilted: 2-1/8".

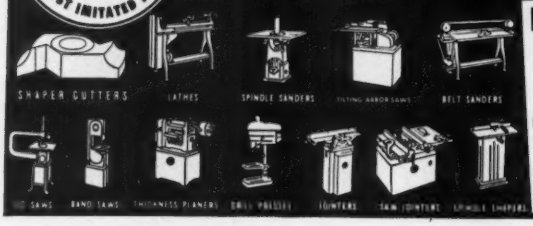
Bench or floor models.

AVAILABLE NOW

through industrial supply distributors in most cities. No long waits for delivery.

High quality, low cost tools for cutting, shaping, drilling and finishing wood, fibre, metals and plastics.

FOR 40 YEARS · BOICE CRANE · AMERICA'S MOST IMITATED POWER TOOLS



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938 Central Avenue · Toledo 6, Ohio

Please send free literature on ( ) Band Saw; ( ) Tilting-Arbor Saw; ( ) Saw-Jointer; ( ) Jig Saw.

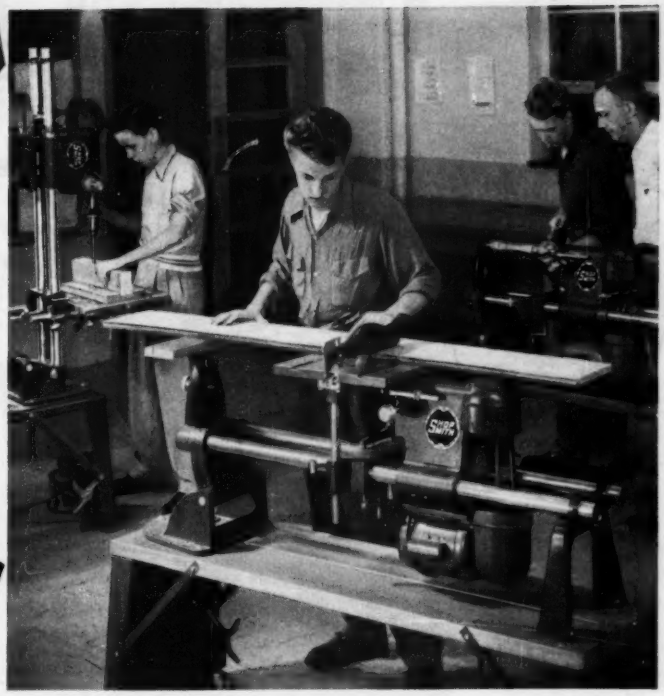
NAME_____

SCHOOL_____

STREET_____

CITY & STATE_____

Can you find the 15 power tools in this picture?



THIS PICTURE illustrates an important new concept in industrial arts training. It's the *Flexible Shop*. It's based on the flexibility inherent in SHOPSMITH, Magna Engineering's multi-purpose power tool.

In the *Flexible Shop*, flexible work stations supplement or take the place of individual power tools. Each of the three SHOPSMITHS pictured above is actually five tools—8" circular saw, 12" disc sander, 33" wood lathe, 15" vertical drill press and horizontal drill. Each can be changed to fit the needs of the class or the teaching techniques of the instructor.

The advantages are apparent and impressive: faster indoctrination in the safe and proper use of each tool (since all SHOPSMITHS can be set up alike), fewer tie-ups (since SHOPSMITHS can be changed to relieve the pressure on one type of tool), 50% saving in space (SHOPSMITH requires a working area of 48 sq. ft. compared to 104 sq. ft. for five separate tools) and fewer budget restrictions (SHOPSMITH costs $189.50 less motor, $232.45 with motor and special school guards).

In each of its five basic positions, SHOPSMITH is a different, basic, single-purpose tool—a tool that will equal or exceed the performance of the tool it replaces. Operation is standard. Quality is well above standard – heavy, fine grain castings; ball-bearing spindle, tolerances found only in the finest tools. Write for results of educators' research on the *Flexible Shop* and detailed SHOPSMITH specifications.

Magna Engineering Corp.

SHOP SMITH

Dept. 198-T, *at factory nearest you*
12819 Colt Road, Cleveland 8, Ohio, OR Mesa Park, California

- **Please send me complete information about the *Flexible Shop* and the application of SHOPSMITH to industrial arts education.**

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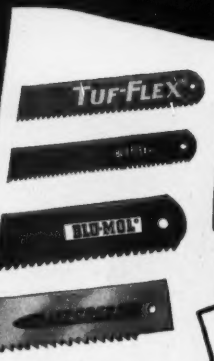
SCHOOL _____

ADDRESS _____

CITY _____ STATE _____

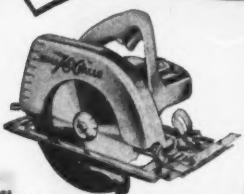
Fine Tools at their BEST

Planes for every purpose — Block, Bench, Rabbet and Router. All built to the highest standards of excellence in design, workmanship and finish.



World's broadest, most advanced line of metal-cutting saws and bands, including "Tuf-Flex"® and "Blu-Flex"® hand blades, "Blu-Mol"® and "Jet-Edge"® power blades.

Hack Saw Frames. A wide variety of styles and types. Sturdy, well-balanced, with firm, comfortable grips — each an outstanding value in its field.



Electric Saws. Light, compact, powerful. New high-capacity 7" model weighs only 11 lbs. Also 9" and 10" heavy duty types for continuous, production work.

Levels of Lasting Accuracy. Lightweight Aluminum models. Wood levels of finest straight-grain white pine. Handy, low-cost Torpedo and Line Levels.

"Langdon Acme" and "All-Steel" Mitre Boxes. For years, the first choice of professionals for fast, easy, accurate work.

Heavy Duty Grinders. Precision balanced motors and oversize labyrinth-sealed ball bearings for smooth operation under heavy loads. 6", 7" and 10" wheels.

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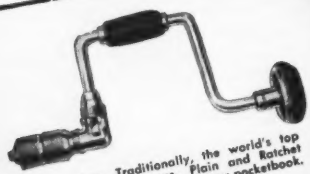
Automatic Drills. A famous line, known the world over for quick, one-hand, small-hole boring.

Spiral Ratchet Screw Drivers. With or without return spring. Fast and smooth-acting. Drive and draw screws automatically.



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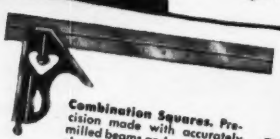

Combination Squares. Precision made with accurately milled beams and graduations clearly etched — not stamped — on blades.

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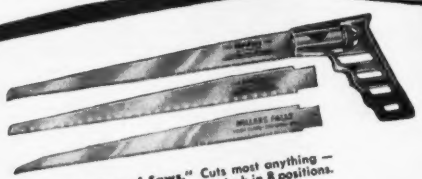

No. 725 "Nest of Saws." Cuts most anything — most anywhere. Blades turn and lock in 8 positions. One of the handiest tools a man can own.

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no mixing
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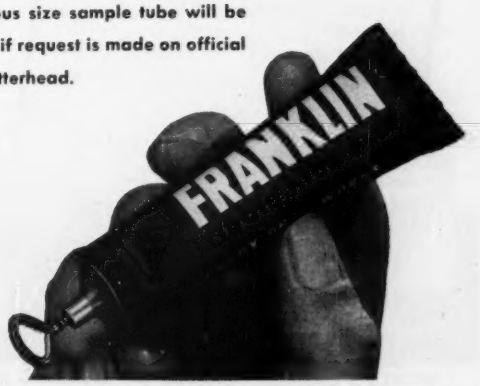
Make this test . . . Get this tube Free!

1. Squeeze a little Franklin Glue on a piece of glass or clean wood. Squeeze out the same amount of any other liquid glue beside it.

2. Let set overnight, then compare the two. Leave for two or three days and note the difference.

A generous size sample tube will be sent free if request is made on official school letterhead.



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LISTED UNDER RE-EXAMINATION SERVICE — UL — UNDERWRITERS' LABORATORIES, INC.

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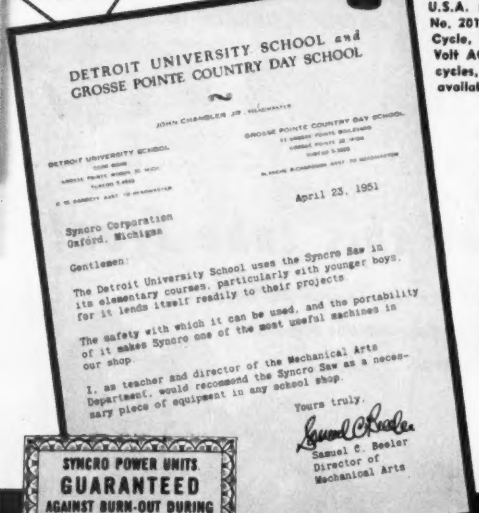

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The Detroit University School uses the Syncro Saw in its elementary courses, particularly with younger boys, for it lends itself readily to their projects.

The safety with which it can be used, and the portability of it makes Syncro one of the most useful machines in our shop.

I, as teacher and director of the Mechanical Arts Department, would recommend the Syncro Saw as a necessary piece of equipment in any school shop.

Yours truly,

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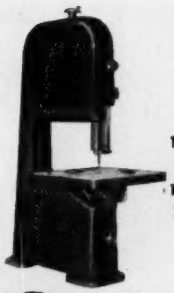

12" Band Saw **$87.50***
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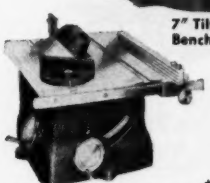

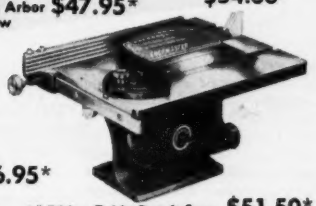

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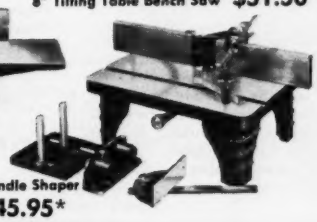

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*Zone 2, less motor. Slightly lower, zone 1.

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The two requirements any school demands of tools are performance and durability. Shopmaster Tools have met this test in schools from coast to coast.

Operated day after day by beginners and students of varying degrees of proficiency, these tools stand up and give amazing results. And they do it for years without an indication of the grueling daily strain to which they're put.

These are precision-built tools with handsome modern lines, designed for convenience. They can be independently powered, or mounted together and powered with one motor.

No doubt about it, the toughest league in the world for a tool is a school. And Shopmaster Tools meet any school's most rigid requirements 100 per cent.

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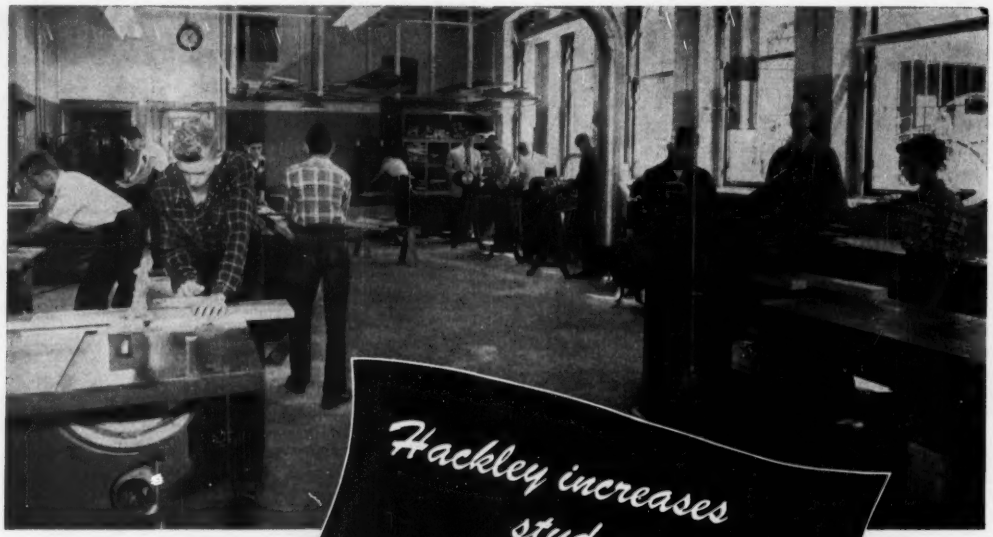
Send me your new full color catalog giving full details on the complete line of SHOPMASTER "Uniform Precision" Tools, and shop layout sheet.



Hackley increases students' skills with "Olivers"

56 years ago Mr. C. H. Hackley founded the Hackley Manual Training School of Muskegon, Mich. From the outset good craftsmanship was stressed. To inspire students to ever higher standards in their craft, the best available woodworking machines were installed.

It was natural that the founder of the Oliver Machinery Company (established 1890) should collaborate with Hackley's director to supply its woodworking machines. Since then, relations between these two pioneer institutions have been most friendly.

Mr. Edward J. Huttenga, Hackley's present Vocational Education Director, stresses thorough woodworking instruction more than ever. Recently, after installing several new "Oliver" machines, Mr. Huttenga wrote:

"We are proud of our cabinet making shop, and have noticed an appreciable increase in the quality of workmanship. Mr. Henry V. Bolt, our instructor, is thoroughly satisfied. It produces accurate work. Its capacity and sturdy construction to endure hard usage would be difficult to replace. This equipment will benefit students for many years to come."

Hackley's students make substantial projects including cabinets, tables, etc., that embody fine craftsmanship in every detail. Surfaces are smooth; joints are perfect and strong. Hackley's experience is proof that proper training in woodworking requires sturdy, precision built machines. "Oliver" equipment also assures safety for students, and ease of operation.

The "Oliver" line of machinery for school shops includes:

Band Saws	Tool Grinders
Jig Saw	Jointers
Mortisers	Boring Machines
Shapers	Wood Trimmers
Circular Saws	Speed Lathes
Sanders	Metal Spinning Lathes
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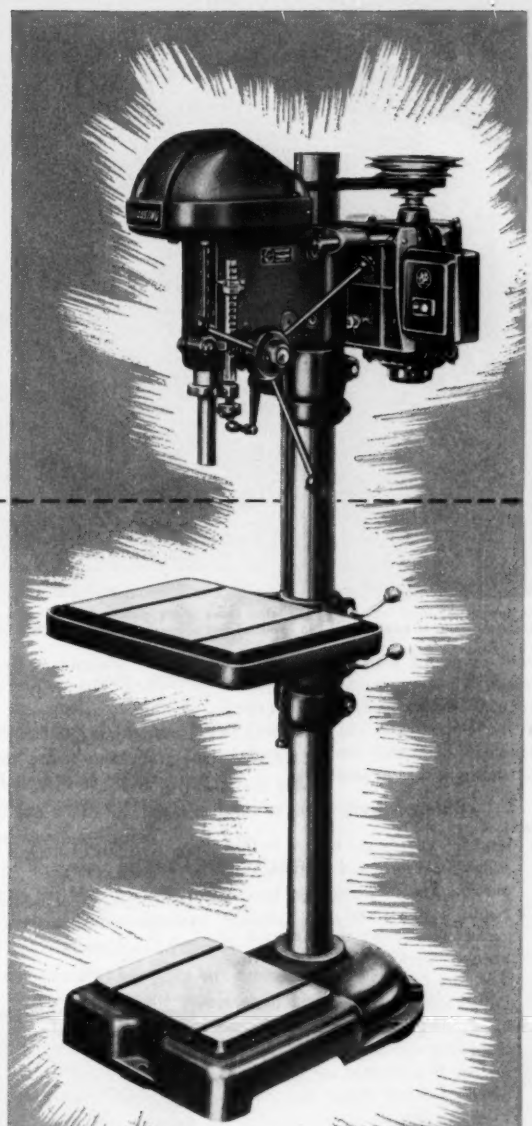

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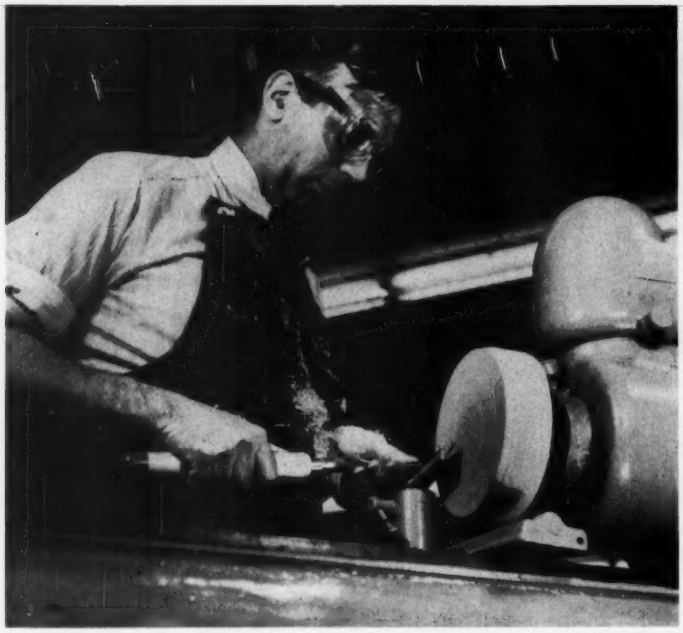


This demonstration of safe use of the lathe shows safety glasses, tool rest close to work, operator has secure grasp of turning tool and is out of line of revolving faceplate. The lighting is adequate.

posed of pupils with the help of the teacher. When it is completed, the members of the class might be asked to check the list individually. This will tend to familiarize them with the safe practices the teacher wishes to emphasize.

Safety Check List

Machines

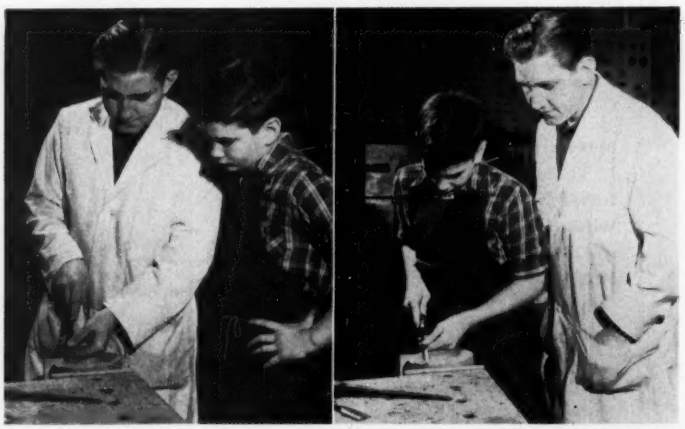
1. Machine guards are always in their proper positions, and are used by all pupils. Yes____, No____.
2. Pupils have learned that it is dangerous to distract the attention of anyone working on a machine. Yes____, No____.
3. Pupils are conscious of the dangers of standing near a bandsaw when it is being operated. Yes___, No___.
4. No one is permitted to run a short piece of wood across the jointer. Yes____, No____.
5. Pupils make sure that a machine is stopped before they oil, clean, or adjust it. Yes____, No____.
6. When using the rip-saw to rip narrow stock, pupils always use the safety pusher. Yes____. No____.
7. When working on the lathe, pupils remove their neckties and have their sleeves rolled up. Yes____, No____.
8. Pupils always use a stick, at least 2' long, when removing scrap from the saw table. Yes____, No____.
9. Stock is never lowered over the circular saw except under the supervision of the teacher. Yes__, No___.
10. The saw table is always kept free of stock except that being worked. Yes____, No____.
11. The operator of the bandsaw keeps his fingers well away from the blade, and never permits his hands to get into the path of the saw. Yes____, No____.
12. Cylindrical stock is never cut on the bandsaw. Yes____, No____.
13. Pupils do not use the machines without permission from the teacher. Yes____, No____.

Hand Tools

1. Since dull tools increase the hazards, all tools are kept sharp and in good condition. Yes____, No____.
2. Edge tools are not placed on the bench so that any sharp edge protrudes over the side. Yes___, No___.
3. Bench tools are placed securely on the bench to prevent them from falling to the floor. Yes____, No____.
4. All files have appropriate handles. Yes____, No____.
5. Hand tools are carried properly so as to avoid injury to the user or to the bystander. Yes____, No____.
6. Pupils avoid trouble from flying metal chips by using a soft-faced hammer when pounding metal. Yes ____, No____.

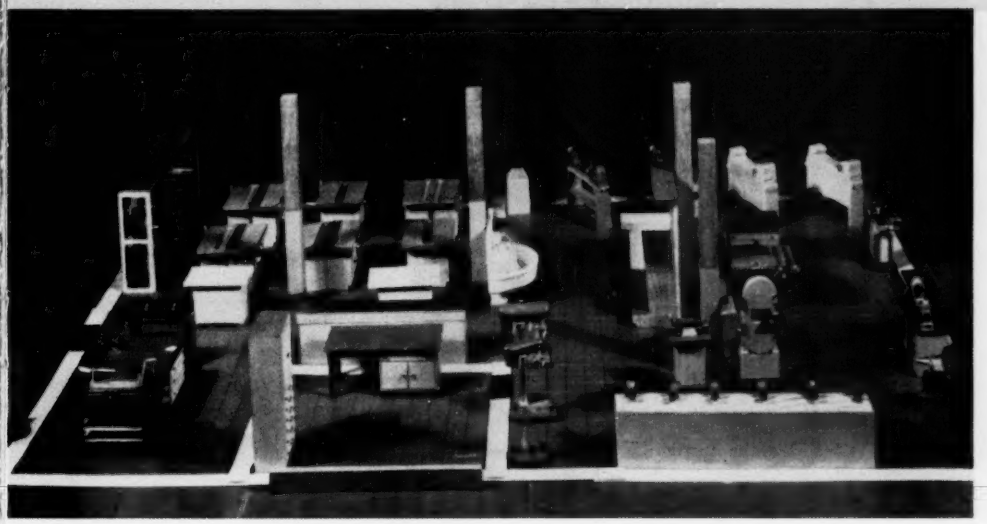
General

1. The teacher observes all the rules of safety. Yes____, No____.
2. Metal containers are provided for oily rags. Yes____, No____.
3. Pupils working in areas where there are eye hazards use goggles. Yes___, No____.
4. Safe clothing is worn by pupils at all times. Yes____, No____.
5. Playing or clowning is prohibited in the shop. Yes____, No____.
6. All injuries are reported to the teacher. Yes____, No____.
7. All aisles are kept clear. Yes____, No____.
8. Pieces of wood with nails protruding are picked up immediately. Yes____, No____.
9. If oil or water is spilled on the floor, it is wiped up immediately. Yes____, No____.
10. When pupils observe a hazard, they report it to the teacher at once. Yes____, No____. ★



Students should be given a demonstration of proper use of sharp cutting tools and then checked to see that lesson has been learned. Note chisels do not project over bench edge to make hazard.

FROM SHOP MODEL TO MODEL SHOP—



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HAND TOOLS AND SCHOOL SHOP EQUIPMENT

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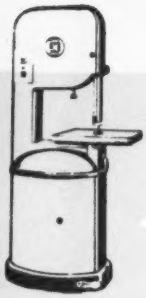

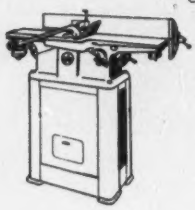

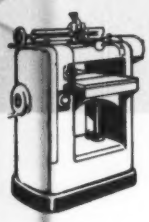

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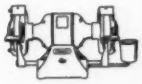

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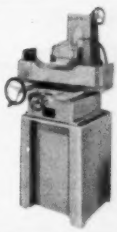

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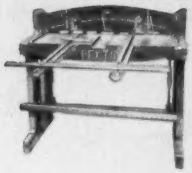

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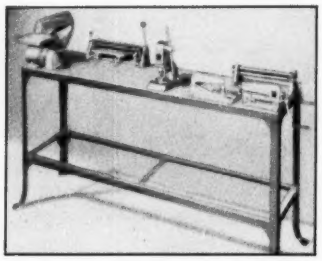

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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Youth—and Safety

In spite of the irresponsibility that accompanies it, youth is a wonderful thing. Life is filled with opportunities for fun and everything and everyone is a potential source of amusement. Nothing is sacred. Danger or injury are experiences which receive little, if any, consideration, as action comes first and, if reflection follows, it does only when an accident occurs.

Have you ever seen a block of wood being projected rapidly through the air by the teeth of a moving circular saw? It is a thrilling spectacle which fills with glee the boy who threw the block. The experience was so stimulating that the boy tried it again and, noting his success, other boys joined in the fun. Unfortunately another boy who was unaware of the game that was going on, happened to get in the path of a block as it sailed through the air, and it hit him in the eye. Now the eye is a valuable part of a person's anatomy and, even if one does not lose it completely, it is distressing to have one's sight impaired.

Of course the individual who was responsible for the accident is a nice boy. He would not willingly hurt anyone. He was only having a little fun. But, nevertheless, he was responsible for injuring one of his fellow pupils. He feels badly about the result of his prank, but someone had to lose an eye before he could be brought to realize that a school shop is not a playground.

Then there is the ingenious young fellow whose sole purpose in life is to invent new devices by means of which he can amuse himself and his fellow pupils. He is a delightful youngster and everybody loves him, but the possibility of someone being hurt has never occurred to him. In one of his more brilliant moments, he conceived the idea of placing a can at a convenient spot over the head of a machine operator. Attached to the can was a string which was led by devious paths to a point quite remote from the scene of action. At the proper moment, when the operator was engrossed in running his machine, the string was pulled and the contents of the can, which might be sawdust or water, were precipitated on to the head of the unsuspecting victim. This was the cause of considerable merriment on the part of the observers, but what of the poor fellow who was under the deluge? At best he was merely annoyed, but at its worst the start that the operator got may have caused the job to be spoiled or have been the means of having him get his hand tangled up in the machine.

It is true the perpetrator meant no harm. He was merely being playful. Moreover he was distressed when someone was hurt, but this was no recompense for the agony of the one who had to suffer a mutilated hand.

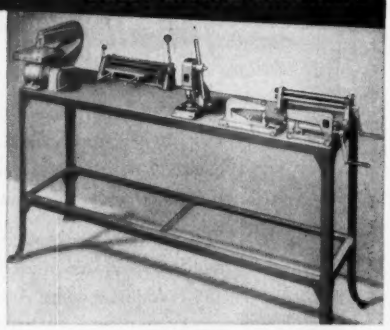
Then there is the thoughtless pupil. He believes that a machine guard is a nuisance. He thinks he can work more effectively without it so he removes it and places it carelessly on the floor. When some innocent person comes along and stumbles over the guard, he gets the merry horse laugh from the others. But what about the boy who was too smart to heed the guard? He gets his fingers tangled up in the gears or in a belt. If he happens to be operating a circular saw there is always a chance that he may find a couple of fingers among the sawdust, and he is sure to be annoyed when he discovers that they belong to him.

And so it goes. We can have lots of

BERKROY TOOLS FOR THORO SHEET METAL TRAINING

SHOP On-A-Bench

A complete 5-tool sheet metal shop in one compact unit. All tools handle sheet steel up to 20-gauge. All operate like larger, industrial shop tools.



TOOL STAND Heavy gauge steel. 18" x 68" x 35".

NIBBLER-SLITTER 12" throat capacity. Cuts odd shapes. Does straight or scroll work.

HAND PUNCH For use with dies, punches and cutting blades for punching, press fits, notches, corner cuts, etc.

12" BRAKE Bends sheets and makes simple metal trim.

SHEAR and CLAMPING HEAD ACCESSORY For trimming, strip cutting, outside circle and contour cutting.

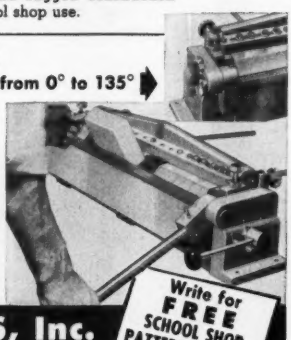
12" SLIP ROLL Forms cylinders, reverse curves, scrolls, etc.

FOR LARGER WORK, WIDER VERSATILITY—24" RING AND CIRCLE SHEAR

The only tool of its type with the *Micro Feed Handle* for adjustment of circle diameters. Cuts rings and circles up to 24" diameter from square stock. Handles a wide variety of trimming operations, strip cutting and contour cutting on sheet metal up to 20 gauge. Cutters are hardened, tempered tool steel. 32" x 7" bed length, 12" x 4½" shear, and 21" x 3¾" clamping head assure capacity for a wide variety of projects, of industrial size. Accurately machined, enclosed gears and rugged construction assure sustained accuracy under constant school shop use.

BERKROY 24" BOX AND PAN BRAKE

With Positive stop at any angle from 0° to 135°



Makes intricate folds, reverse bends and radius bends on sheet steel up to 16 gauge and up to 24" wide. The accuracy, ease and speed of its operation result from features found in no other brake. Bending leaf operates on Torrington Needle Bearings. Full 1" clearance between top fingers and anvil. Maximum 2½" box or pan depth permits deeper bends. Turning a knob provides infinite adjustment to any angle from 0° to 135°. Forms any size box or pan from ½" to 24" by ¼" graduations.

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fun in the shop but let us think before, rather than after, the deed is done. What is the ultimate end of it all? The fun turns to tragedy and the remorse that follows is a poor return for a little entertainment. ★

News

HAPPENINGS IN INDUSTRIAL EDUCATION

AIAA to Meet in Chicago

PLANS are nearly completed for the fourteenth annual convention of the American Industrial Arts Association to be held in Chicago, Illinois, at the Congress Hotel April 29 through May 3. The National Council of Supervisors of Industrial-Arts Education will hold a two-day workshop on April 29 and 30 for which Dr. Earl C. Kelley, professor of education at Wayne University, Detroit, Michigan, will be the leader. At these sessions the problems of supervisors will be discussed with an opportunity for working them out through the cumulative experience of those in attendance.

The first general session of the convention will be held on Thursday morning, May 1, with talks by Alfred P. Haake, economist and consultant to the General Motors Corp., and Kenneth Perry, chairman of the department of arts, Colorado College of Education, Greeley. In the afternoon, group sessions will be held. Shop teachers will have a panel discussion on methods in multiple-activity shops while teacher-education staff members and supervisors will discuss industrial arts in the elementary school with a visual presentation of the program in the Los Angeles, California, schools by Fred Baer, Los Angeles supervisor.

The second general session in the evening will be on the theme, radio and television in industrial arts, with participants as follows: Chris Groneman, Texas A & M College; Lyman Goldsmith, Los Angeles schools; Roy Radtke, Milwaukee, Wisconsin, schools; and Walt Durbahn, Highland Park, Illinois, schools, and star of the TV program "Walt's Workshop."

Group sessions are scheduled on Friday morning for teacher-education staff members, classroom teachers, and supervisors while in the afternoon a session for teachers in training is planned. The general session will be held Friday afternoon on the topic of industry, industrial arts and general education with talks by John Ludington, U. S. Office of Education, and D. Orton, IBM Corp., New York City.

The annual banquet will be held Friday evening with a talk by Herold C. Hunt, superintendent of the Chicago schools, followed by the Ship's Program and distribution of prizes. On Saturday morning the business session and demonstrations of methods and materials will be held.

Byrn Memorial Award

FRIENDS and associates of the late Marshall Byrn, assistant professor of vocational education and head of the industrial-arts department in the University High School, University of Michigan, Ann Arbor, are establishing a memorial award in his honor, the nature of which will be determined later. Contributions may be sent to J. B. Edmonson, School of Education, University of Michigan, Ann Arbor.

Iowa Conference

THE vocational-education department at Iowa State College, Ames, is sponsoring a one-day Industrial Education Conference on April 18 for administrators, supervisors, and teachers. Fred J. Schmidt, Jr., head, industrial-arts department, Ball State Teachers College,

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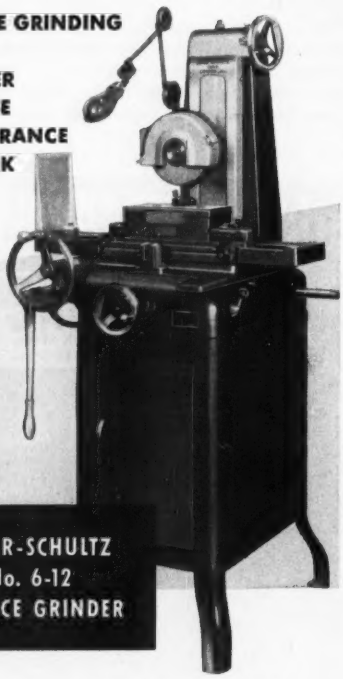

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Flatness and parallelism GUARANTEED to within 2/10 (.0002). Low First Cost. Easy Operation. 8 to 10 Weeks Delivery.

The excellent performance of this machine tool, that has been *proved* in so many shops, is the net result of unusually sturdy design, fine quality materials and the untiring efforts of skilled craftsmen who know what a fine precision machine tool should do.

Boyar-Schultz No. 6-18 Surface Grinder

A heavy duty, precision tool room machine built for sustained accuracy in both tool room and in production.

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10 LBS. $9.50

20 Lbs.....17.50
40 Lbs.....34.00
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Finest quality and the best colors in all new, flat, paper-masked Plexiglas and Lucite. Sizes 6" x 12" and larger in the assortment.

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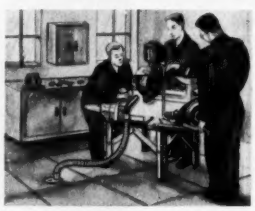

HUNDREDS OF "NATIONAL" SCHOOL INSTALLATIONS PROVE THE ADVISABILITY OF ELIMINATING THIS HEALTH HAZARD

"National" Systems remove poisonous carbon monoxide gas at the source without heat loss. Pupils in school shops are free from the danger of deadly fumes. Easily installed in new or existing buildings. No rearrangement of present shop layout necessary.

The "National" System comes in a complete packaged kit, including motor and blower unit, intake and discharge chamber, flexible tubes, duct work, switches, etc. READY TO INSTALL—NOTHING ELSE TO BUY. Overhead or Underfloor Systems engineered to each individual application.

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Muncie, Indiana, will be the speaker and there will be panel discussions, demonstrations, and educational displays.

Wisconsin Clinic

THE industrial-arts division of Wisconsin State College, Platteville, will hold an Industrial-Arts Clinic July 14-18 for the upgrading of industrial-arts teachers. Demonstrations and individual work in various shop areas will be given.

Virginia Group to Meet

THE Virginia Council of Industrial Education Clubs is planning a state-wide meeting to be held in Richmond this month. The one-day session will include a talk by an outstanding leader in the field, educational displays, and commercial exhibits.

California Teachers to Meet

"TEACHING AIDS" will be the theme of the annual convention of the California Industrial Education Association which will meet April 3-5 at Laney Trade and Technical Institute, Oakland. High point of the program will be a teacher-demonstration of the six outstanding teaching aids as selected by the judges with a popular vote determining the grand winner. At the banquet an award will be given to the lay person in California who has made the outstanding contribution to industrial education.

Epsilon Pi Tau at NYU

ALPHA RHO chapter of Epsilon Pi Tau has been founded at New York University, New York City, with the installation taking place on February 9. Thirty-seven members were initiated and Robert L. Thompson of New York University was named trustee. Speakers at the banquet included Gordon O. Wilber of Oswego, N. Y., State Teachers College, and William E. Warner, formerly of Ohio State University.

New York Association Convention

THE NEW YORK State Vocational and Practical Arts Association annual convention will be held April 3-5 at the Hotel Syracuse in Syracuse, N.Y. Short workshop sessions will be a feature of the meeting.

Safety Workshop

A TWO-WEEK safety workshop will be held at San Francisco State College this summer under the direction of Jesse Rathbun, coordinator of industrial arts for the San Francisco, California, schools. Other two-week workshops are also being planned this summer, according to Dwight W. Nichols, director of industrial arts at the college.

Safety Articles from School Shop

FOR your reference, here is a list of articles and special features on safety that have appeared in past issues of SCHOOL SHOP. Those readers who have back copies available will find these articles helpful in organizing safety programs in their shops.

Burnham, Harry A. "Shop Safety Program in the Flint Schools," I:9 (May, 1942), 7.

Chatfield, William D. "Avoid Accidents—Teach Shop Safety," X:2 (Oct., 1950), 32.

Cook, G. C. "Safety in the School Shop," I:5 (Jan., 1942), 3-5.

Greenwood, Donald B. "Are You in the Doghouse?" VI:1 (Sept., 1946), 8-9, 14.

Hamel, A. V. "Non-Skid Flooring," III:8 (April, 1944), 15.

Hillebrandt, H. F. "A Look at Shop Safety Education," IV:9 (May, 1945), 5-6, 30.

Hughes, Wayne P. "Safety Factors in Shop Planning," VIII:8 (April, 1949), 7-8.

Hughes, Wayne P. "Plan for Safety in Purchasing," IX:8 (April, 1950), 8-9.

Hunt, DeWitt. "Minimum Safety Guards," V:5 (Jan., 1946), 9.

National Safety Council. "Time-Saver Standards for Safety," V:10 (June, 1946), 22.

National Safety Council. "Wartime Safety Education in Shops," III:9 (May, 1944), 3-5.

Scherer, Francis R. "Non-Skid Shop Floors," I:5 (Jan., 1942), 7.

Willoughby, George A. "Quiz on Safety and Maintenance," VII:1 (Sept., 1947), 10, 21.

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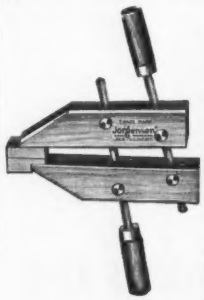

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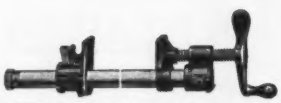

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Make Your Shop Safer With Color

By Gus Pascale

Here is how color can be used for safety. Gus Pascale teaches at Roosevelt School, Union City, N. J.

WITH added courses and increasing enrolment, the industrial-arts teacher has acquired added responsibility for the safety instruction of his students. Industries and the armed forces have been studying colors and their relationship to the accident problem. A result of these studies is the belief that glare and dark colors are important contributing factors in many shop mishaps.

Consequently, school people believe that color design in school shops can effect all phases of safety instruction and aid in reducing school-shop accidents.

With this in mind, the Roosevelt School shop in Union City, N. J., has been repainted under the supervision of Superintendent of Schools Albert C. Parker and Supervisor of Industrial Arts Fred Wardel. Many of the color features recommended by authorities on the subject were incorporated into the plans for the shop.

Since fatigue is listed as a frequent cause of accidents, walls were painted an "eye-resting" light green on the top and a tan dado below. Contrasting colors were used for machines, switches, guards, and electrical connections. Machines in the shop were painted a dark green. The ceiling was painted white, giving an added illusion of height as well as better light reflection. All electrical connections, buttons, and switches were done in red for ease of identification. Danger points, such as saw guides and fences on the green machines, were made a contrasting and easily recognizable yellow. Oil cups for lubricating the machines are readily discernible by a bright orange color. All levers and wheels were painted buff.

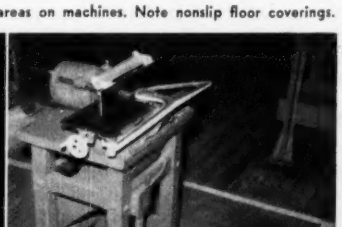
Another area where the use of color can aid in accident reduction and elimination is at the focal point—the place where actual work is being done. The post on the wood lathe and the cutting area on the bandsaw, for example, were painted dark gray to contrast with the light-colored wood. Wood vises were painted similarly. The metal lathe and vises have the focal point painted with a contrasting ivory against the gray metal color.

A tile-red abrasive compound was painted on the floor at the work areas of the machines in order to minimize the possibility of slipping. These areas on the floor were outlined by a 2" yellow border.

Color, properly used, can help the industrial-arts teacher to locate tools. The interior of the tool cabinet, therefore, was painted buff. The outline of each tool (hammers, saws, planes, files, etc.) was painted green on the wall. By this means it is apparent immediately when a tool is not in its proper place.

Safety education also can be aided by the use of color. Eyes do not become fatigued by glare or strained by darkness when light colors are used on walls and ceilings. Important guards, switches, and lubricating points are easily identified with contrasting colors. Colors in contrast to the wood or metal work emphasize the focal point. Those who have studied this method believe that this indirect approach improves shop safety habits and tends to help safety instruction. There is energy in color. Take advantage of it in your shop safety education. ★

Color indicates control mechanisms and danger areas on machines. Note nonslip floor coverings.



Major Carl L. Sitter, USMC Medal of Honor

THE HILL WAS STEEP, snow-covered, 600 feet high. Red-held, it cut our lifeline route from Hagan-ri to the sea; it had to be in our hands.

Up its 45-degree face, Major Sitter led his handful of freezing, weary men—a company against a regiment! The hill blazed with enemy fire. Grenade fragments wounded the major's face, chest, and arms. But he continued heading the attack, exposing himself constantly to death, inspiring his men by his personal courage. After 36 furious hours the hill was won, the route to the sea secured. Major Sitter says:

"Fighting the Commies in Korea has taught me one thing—in today's world, *peace is only for the strong!* The men and women of America's armed forces are building that strength right now. But we need your help—and one of the best ways you can help us is by buying United States Defense Bonds.

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★ ★ ★

Remember, when you're buying bonds for national defense, you're also building a personal reserve of cash savings. Remember, too, that if you don't save *regularly,* you generally don't save at all. Money you take home usually is money spent. So sign up today in the Payroll Savings Plan where you work, or the Bond-A-Month Plan where you bank. For your country's security, and your own, buy Defense Bonds now!

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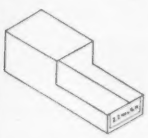
Radio Parts Storage

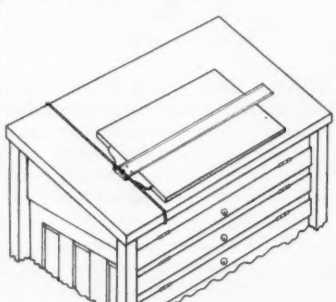
Discarded milk cartons make very good containers for storage of small radio parts, we have found. The cartons can be cut into trays and index tabs glued to the front as shown in the drawing. The wax should be scraped off the part where the tab is to be fastened.



These trays have several advantages over other methods of storage. They cost nothing and can be replaced easily. The parts in each tray can be seen readily. They provide a flexible storage system as they can be shifted around wherever necessary.—*Edward F. Driscoll, High School, Brookline, Mass.*

Protect Those T-squares

T-squares are delicate instruments and are subject to serious damage by falling from the drawing board. This tendency is increased considerably by the fact that they are used by young people who are likely to lack mature judgment. In order to minimize the injury resulting from such falls a scheme has been devised that anchors the square to the board, while permitting the freedom of movement necessary for effective use.



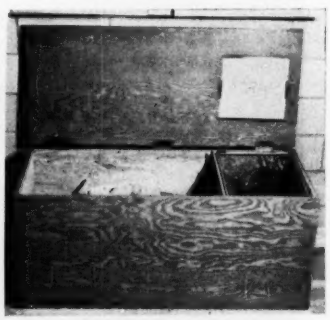
A cord, attached to screw eyes located beneath the upper and lower edges of the drawing table, was loosely stretched through another screw-eye in the head of the T-square. This permits the square to move freely vertically. For horizontal movement, the pupil may move the drawing board if the slack in the cord does not provide as much freedom as he needs.

For left-handed pupils an extra cord can be added on the right-hand side of the table, with a ring attached to the eye in the T-square, to permit changing from side to side.

It is conceded that the cords do not add to the neatness of the room, but it is believed that this disadvantage is more than offset by the saving in T-squares.—*Cecil Acuff, Duncan Public Schools, Duncan, Okla.*

The Scrap Box

The problem of handling and storing lumber has been adequately solved in most shops except for small usable pieces and scrap. The box shown in the photograph has eliminated our headaches on this score.



This box, constructed of ¾" plywood, should be made to fit the available space as well as the size and amount of scrapwood that accumulates in your shop. The partition that separates the scrap wood from the usable small pieces is permanently installed. The metal insert for the scrap side is made of 28-gage galvanized iron and has the top edges rolled in to prevent accidents and to serve as handles. The lid makes a neater appearance in the shop than an open box.

Students no longer have to look through an accumulation of scrap wood to find what they want. The safety engineers use it for lessons in safety and report that the job of keeping the floors safe is much easier. The custodian willingly empties the metal insert each day. —*Clifford R. Baker, Everett School, Detroit, Mich.*

Extra Copies Available of This Special Safety Issue

THIS Safety Issue of SCHOOL SHOP will make excellent material for use in teacher-training classes and for inservice training programs in city systems. Single copies are available at 50c each from the Circulation Department, SCHOOL SHOP, 330 South State St., Ann Arbor, Michigan.

Industry Wants . . *from page 12*

obtainable from safety councils, state or federal agencies, and insurance companies.

Control of Accident Hazards

One of the most important phases of any accident-prevention program is the control of accident hazards. This includes (1) safeguarding of machines and equipment; (2) establishment of safe methods and good practices; (3) control of occupational disease exposures; (4) provision of personal protective devices.

This practice applies equally well to school shops. Machines and equipment must be provided with all necessary guards. In addition, the ultimate objective of all industrial-art teachers should be to establish within each pupil safe work habits, as well as a feeling that safe methods and good practices are essential to good job performance.

Adequate In-Plant Medical Program

Most industrial plants provide some form of medical service. The purpose of this is to minimize the extent of an accident by assuring proper medical treatment.

Every school shop should be provided with adequate first-aid facilities. Where possible it would be desirable to have on the school staff a qualified first-aid worker.

Regular Plant Inspections

In any well-organized plant safety program, periodical inspections are made in order to discover unsafe conditions or practices.

Each school-shop teacher should prepare an inspection form, based on the conditions that exist in any specific school. This form should be used by a pupil who has been designated as safety inspector, in the same manner as it would be used in an industrial plant.

Investigation of Accidents

The investigation of an accident has educational value as it is likely to reveal causes, and it tends to indicate deficiencies in the provisions for safety.

It is essential that all accidents that occur in the school shop be investigated, not for the purpose of placing the blame, but rather to enable the school authorities to prevent further injury from the same cause. The investigation might be delegated to group leaders, who would work under the general direction of the teacher.

In drawing this analogy between the school shop and the industrial plant it becomes clear that the shop instructor can benefit from the experience gained by industry and apply the methods suitable to his own shop. Safety programs become effective only when each student feels that safe work habits, safe methods, and good practices are the basic requirements of doing a good job. Safety consciousness should become second nature with the student.

Summing up, if the student becomes familiar with the methods used to promote industrial safety, the experience will stand him in good stead whether he enters industry or some other field. The instructor, thus, will have made a big step toward fulfilling his responsibility in safety education. ★

Metal Shop . . . . . *from page 28*

for use and are reported to the teacher. Yes_____ No_____.

8. It is a standard rule that hand tools shall be put away in their proper places when the worker is through using them. Yes_____ No_____. ★

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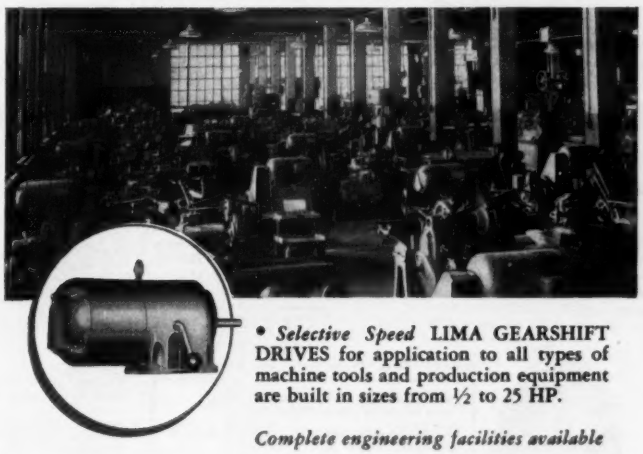

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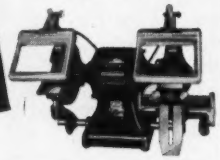

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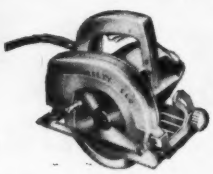

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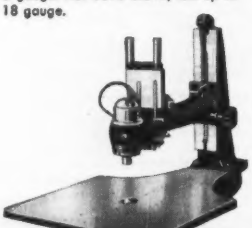

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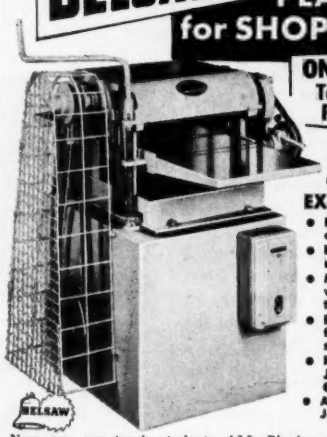

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Useful References on Safety

AMONG the books which deal with safety in the school shop, the following will be found by shop teachers to be particularly valuable for reference and reading purposes. They should be part of every industrial-education library.

Safety Education in the School Shop. National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. 1948. Pp. 68. (Paper bound.)

This manual is intended to serve as a general guide to safe procedures in the school shop and is most helpful to shop teachers. It is adaptable to both large and small school systems and will supplement specific shop lessons, rules, or regulations in operations in a school.

The responsibilities of the teacher and supervisor are outlined. The problems of housekeeping and shop inspection, as they are related to accident prevention, are discussed. The legal liability for accidents, as well as protective insurance, are dealt with and the various physical and human causes of accidents are considered.

Every shop teacher should have a copy of the manual as a guide in his efforts to eliminate the hazards existing in his shop.

Accident Prevention Manual. 2nd Edition. 1951. National Safety Council, 425 North Michigan Ave., Chicago 11, Ill. Pp. VII and 843.

This book was prepared primarily for use in industrial plants. However, it contains much that is of value to those who have the responsibility for safety in the school shop.

It is not a text, but is intended to serve as a reference for anyone interested in providing safe conditions for those who work with hand tools or machines.

Much of the material has a direct bearing on the activities being carried on in school shops, and it provides valuable suggestions to the teacher concerning safety conditions and procedures.

There should be a copy in the library of every school where shop work is a part of the school program.

Accident Facts. 1951 Edition. National Safety Council, 425 N. Michigan Avenue, Chicago 11, Ill. Pp. 97. 75c.

This publication contains a wealth of statistical material on accidents. Data are included covering accidents in the home, on the farm, in the school, as well as on occupational accidents and those occurring in the field of transportation.

Shop Safety Education. The University of the State of New York, Albany, N.Y. Pp. 195. $2.55.

This book was prepared by a committee under the general direction of staff members from the State Education Department of New York and the School of Industrial and Labor Relations, Cornell University.

It covers quite adequately such topics as the administration of a school-shop safety program, guarding machinery, personal protective devices, safe practices in school shops, and the promotion of industrial safety by public agencies.

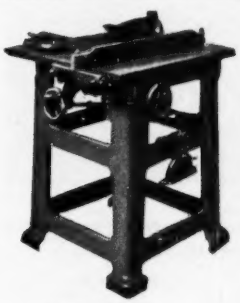
The publication should be included as one of the important reference books in every school-shop library.

School Shop Safety Manual. Board of Education of the City of New York, 110 Livingston St., Brooklyn, N.Y. 1948. Pp. 248. 55c.

The material in this bulletin is directed at conditions existing in the various departments in schools where manipulative work is being carried on.

It sets up a list of regulations for each type of shop work which have been so clarified that they are easily understood and followed. The primary purpose, however, is to help safeguard the pupils in the shop.

It presents suggestions on electrical work, metal work, printing, woodworking, needle work, beauty culture, food merchandising, and baking. Copies should be available for the information of all shop teachers in a school.



Wallace No. 11
Universal Saw

Spindle raises, lowers, tilts—table remains level on all cuts. Trouble-free direct-drive motor gives more power transmission. Motors up to 3 H.P.—up to 4" depth capacity, 48" rip.

Buy the Best—Buy Wallace!

The best is the cheapest — so for true, long-range economy, buy Wallace woodworking machines.

These machines are engineered for better work. They are built of better materials — they perform better, last longer, are easiest on your annual budget.

Illustrated are four units from our complete line of tools for the modern school shop. Write to us TODAY for bulletins and prices on the products you need.

Wallace No. 10
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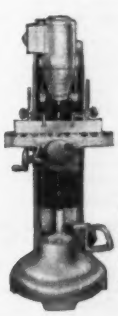
Four-knived—with knives at an angle to give a shearing cut! Direct or gear drive for 20,800 cuts per minute. Variety of table sizes to give up to 6'4" overall length!

Wallace No. 16
16" Bandsaw

For faster, smoother cutting—with minimum blade breakage. Balanced wheels and smooth direct drive transmission eliminate vibration. Optional wheel speeds. Built-in light. Motors to 2 H.P.



Wallace No. 9
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The same machine used in hundreds of cabinet shops and mills—a husky machine with chisel capacity from ¼" to ¾" selling in a moderate price range.

J. D. WALLACE & CO. 170 S. California Ave. Chicago 12, Ill.

Suppliers Directory

A complete and up-to-date guide to sources of equipment and supplies needed in shopwork. Addresses have been given in each case for your convenience in writing firms listed. On your request all firms listed will be glad to supply you with catalogs and information about their products. Please mention *School Shop* when writing.

ABRASIVE PAPER, CLOTH

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

ABRASIVE STONES, WHEELS

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

AIR COMPRESSORS

Brunner Mfg. Co.
1821 Broad St.
Utica, N. Y.

AIRCRAFT TOOLS

The Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio
Proto Tools
2209 Santa Fe Ave.
Los Angeles 54, Calif.
Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

AIRPLANE MODELS, SUPPLIES

Craft Service
337 University Ave.
Rochester 7, N. Y.
X-acto Crescent Products Co., Inc.
440 Fourth Avenue
New York 16, N. Y.

AUDIO AND VISUAL AIDS
(See Also Projectors)

Aluminum Co. of America
801 Gulf Bldg.
Pittsburgh 19, Pa.
Chas. A. Bennett Co., Inc.
237 N. Monroe St.
Peoria 3, Ill.
Jam Handy Organization
2821 E. Grand Blvd.
Detroit 11, Mich.
North Bros. Mfg. Co.
Lehigh & American Ave.
Philadelphia 33, Pa.
United World Govt. Films
1445 Park Ave.
New York 29, N. Y.
Universal Scientific Co., Inc.
Vincennes, Ind.

AUTOMOTIVE SHOP EQPT.
(see also hand tools, mechanics)

Atlas Press Company
1936 N. Pitcher St.
Kalamazoo, Mich.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
The Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio
Crescent Tool Co.
Jamestown, N. Y.
Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 18, Ill.
R. K. LeBlond Machine Tool Co.
Madison &Edwards Rds.
Cincinnati 8, Ohio
National System of Garage Ventilation, Inc.
Dist. A-19—318-330 N.
Church St., Decatur, Ill.
Porter-Cable Machine Co.
1714 N. Salina St.
Syracuse 8, N. Y.
Proto Tools
2206 Santa Fe Ave.
Los Angeles 54, Calif.
Rockwell Mfg. Co. Delta Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.
E. H. Sheldon & Co.
Muskegon, Mich.
Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Illinois

BENCHES, SHOP, METAL OR WOOD
(see also shop furniture)

American Type Founders Sales Corp.
200 Elmora Ave.
Elizabeth 8, N. J.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Engineering Mfg. Co.
619 N. Commerce St.
Sheboygan, Wis.
E. H. Sheldon & Co.
Muskegon, Mich.
Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.
South Bend Lathe Works
425 E. Madison St.
South Bend 22, Ind.
The Tolerton Co.
265 N. Freedom Ave.
Alliance, Ohio

BITS, AUGER

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Greenlee Tool Co.
2136 Twelfth St.
Rockford, Ill.
Oliver Machinery Co.
1025 Clancy Ave., N.E.
Grand Rapids 2, Mich.
Rockwell Mfg. Co. Delta-Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.
Stanley Tools
New Britain, Conn.

BLOW TORCHES

American Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.
Clayton & Lambert Mfg. Co.
1701 Dixie Highway
Louisville 10, Ky.
Linde Air Products Co., a division of Union Carbide & Carbon Corp.
30 E. 42nd St.
New York 17, N. Y.

BLUEPRINTING EQPT.
(see also drafting eqpt.)

The Frederick Post Co.
3650 N. Avondale Ave.
Chicago 18, Ill.

BOOKBINDING EQPT.

Amer. Type Founders, Inc.
200 Elmora Ave.
Elizabeth 8, N. J.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
General Binding Corp.
812 W. Belmont Ave.
Chicago, Ill.
Tompkins Printing Eqpt. Co.
718 So. Clark St.
Chicago 5, Ill.

BOOKS
(see publishers)

BRACES, BITS
(see also hand tools, woodworking)

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Millers Falls Co.
Greenfield, Mass.
North Bros. Mfg. Co.
Lehigh & American
Philadelphia 33, Pa.
Stanley Tools
New Britain, Conn.
X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

CABINETS, TOOL AND STORAGE

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
E. H. Sheldon & Co.
Muskegon, Mich.
The Tolerton Co.
265 N. Freedom Ave.
Alliance, Ohio

CALIPERS

American Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.
Millers Falls Co.
Greenfield, Mass.
L. S. Starrett Co.
Crescent St.
Athol, Mass.

CASTINGS

Casting Specialties
1925 N. 49th
Milwaukee 1, Wis.
Pootatuck Corp.
2448 Main St.
Stratford, Conn.

CERAMIC KILNS, ELEC.

Electric Hotpack Co., Inc.
Cottman at Melrose
Philadelphia 35, Pa.
Harper Elec. Furnace Corp.
39 River St.
Buffalo 2, N. Y.
Western Materials Co.
39 S. LaSalle St.
Chicago 3, Ill.

CERAMIC SUPPLIES

Amer. Handicrafts Co.
45-49 S. Harrison St.
East Orange, N. J.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Craft Service
337 University Ave.
Rochester 7, N. Y.
Electric Hotpack Co., Inc.
Cottman at Melrose
Philadelphia 35, Pa.
L. & L. Mfg. Co.
Chester 9, Pa.

CHISELS, METALWORKING

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.
Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio
Crescent Tool Co.
Jamestown, N. Y.
Proto Tools
2209 Santa Fe Ave.
Los Angeles 54, Calif.
Stanley Tools
New Britain, Conn.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

CHISELS, WOODWORKING

(see also hand tools, woodworking)

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio
Craft Service
337 University Ave.
Rochester 7, N. Y.
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Henry Disston & Sons
Tacony, Phil. 35, Pa.
Duro Metal Prod. Co.
2649 No. Kildare Ave.
Chicago 39, Ill.
Greenlee Tool Co.
2136 Twelfth St.
Rockford, Ill.
Proto Tools
2206 Santa Fe Ave.
Los Angeles 54, Calif.
Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.
Stanley Tools
New Britain, Conn.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N.Y.
X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

CLAMPS, "C"

Adjustable Clamp Co.
405 N. Ashland Ave.
Chicago, Ill.
Amer. Handicrafts Co.
45-49 S. Harrison St.
East Orange, N. J.
Armstrong Bros. Tool Co.
5252 W. Armstrong Ave.
Chicago 30, Ill.
Billings & Spencer Co.
1 Laurel St.
Hartford 1, Conn.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Wetzler Clamp Co.
43-15 11th St.
Long Island City 1,N.Y.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.
X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

CLAMPS, METALWORKING

Adjustable Clamp Co.
405 N. Ashland Ave.
Chicago, Ill.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
E. H. Sheldon & Co.
Muskegon, Mich.
Wetzler Clamp Co.
43-15 11th St.
Long Island City, N.Y.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

CRAFTS SUPPLIES

Amer. Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.
Amer. Type Founders, Inc.
200 Elmora Ave.
Elizabeth 8, N. J.
The Borden Company, Chemical Div.
350 Madison Ave.
New York 17, N. Y.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.
Commercial Plastics & Supply Corp.
630 Broadway
New York 12, N. Y.
D. W. Cope—Plastics
9833 Highway 99
St. Louis 21, Mo.
Craft Service
337 University Ave.
Rochester 7, N. Y.
Craftsman Supply House
35 Browns Ave.
Scottsville, N. Y.
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
DonJer Products Co.
51-47 69th St.
Woodside, Long Island, N. Y.
Educational Materials, Inc.
46 E. 11th St.
New York, N. Y.
Empire Tackle Co., Inc.
2 Genesee St
New Hartford, N. Y.
The Gearon Co.
27 S. Desplaines St.
Chicago 6, Illinois
Gyro Lamp & Shade Corp.
5402 N. Clark St.
Chicago 40, Ill.
J. C. Larson Co.
820 S. Tripp Ave.
Chicago 24, Ill.
Metal Crafts Supply Co.
10 Thomas St.
Providence 3, R. I.
Metal Goods Corp.
5239 Brown Ave.
St. Louis 15, Mo.
The Meyercord Co.
5323 W. Lake Ct.
Chicago 44, Ill.
Petersen Bros.
3823 N. Southport Ave.
Chicago 13, Ill.
Plastic Parts & Sales
1157 S. Kingshiway
St. Louis 10, Mo.
Plastic Products Co.
371 S. Main St.
P.O. Box 1415
Salt Lake City 11, Utah
Plastic Supply Co.
2901 N. Grand Blvd.
St. Louis 7, Mo.
Russo Handicraft Supplies
245 S. Spring St.
Los Angeles 12, Calif.
School Products Co.
111 Hudson St.
New York 13, N. Y.
X-acto Crescent Prod. Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

CUTTING TOOLS, MACHINE SHOP

Armstrong Bros. Tool Co.
5252 W. Armstrong Ave.
Chicago 30, Ill.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
Henry Disston & Sons, Inc.
Tacony, Philadelphia 35, Pa.
Kearney & Trecker Corp.
6784 W. National Ave.
Milwaukee 14, Wis.
L. S. Starrett Co.
Crescent St.
Athol, Mass.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

DIVIDERS

C-Thru Ruler Co.
827 Windsor St.
Hartford, Conn.
Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.
Millers Falls Co.
Greenfield, Mass.
The Frederick Post Co.
3650 N. Avondale Ave.
Chicago 18, Ill.
L. S. Starrett Co.
Crescent St.
Athol, Mass.

DRAFTING EQPT.

Brodhead-Garret Co.
4560 E. 71st St.
Cleveland 5, Ohio
C-Thru Ruler Co.
827 Windsor St.
Hartford, Conn.
Engineering Mfg. Co.
619 N. Commerce St.
Sheboygan, Wis.
A. W. Faber-Castell Pencil Co., Inc.
41 Dickerson
Newark 4, N.J.
Frederick Post Co.
3650 N. Avondale Ave.
Chicago 16, Ill.
E. H. Sheldon & Co.
Muskegon, Mich.

DRAFTING SUPPLIES

American Lead Pencil Company
500 Willow Ave.
Hoboken, N. J.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
C-Thru Ruler Co.
827 Windsor St.
Hartford, Conn.
Eagle Pencil Co.
703 E. 13th St.
New York 9, N. Y.
Eberhard Faber Pencil Co.
37 Greenpoint Ave.
Brooklyn 22, N. Y.
Engineering Mfg. Co.
619 N. Commerce St.
Sheboygan, Wis.
A. W. Faber-Castell Pencil Co., Inc.
41 Dickerson
Newark 4, N.J.

Frederick Post Co.
3650 N. Avondale Ave.
Chicago, Ill.

School Products Co.
111 Hudson St.
New York 13, N. Y.

DRILL PRESSES

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Cassady-Otto Div. Cincinnati Lathe & Tool Co.
3207 Disney Ave.
Cincinnati 9, Ohio

Cincinnati Lathe & Tool Co.
Oakley, Cincinnati
9, Ohio

Duro Metal Prod. Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Magna Engineering Corp.
Menlo Park, Calif.

Rockwell Mfg. Co. Delta Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.

Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.

South Bend Lathe Works
425 E. Madison St.
South Bend 22, Ind.

Walker-Turner Div. Kearney & Trecker Corp.
Plainfield, N. J.

DRILLS, HAND
(see also hand tools)

Bradhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Millers Falls Co.
Greenfield, Mass.

North Bros. Mfg. Co.
Lehigh & American
Philadelphia 33, Pa.

Plastic Products Co.
371 S. Main.
P.O. Box 1415
Salt Lake City 10, Utah

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Stanley Tools
New Britain, Conn.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

DRILLS, PORTABLE ELECTRIC
(see also portable electric tools)

Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago, Ill.

Millers Falls Co.
Greenfield, Mass.

Plastic Parts & Sales
1157 S. Kingshighway
St. Louis 10, Mo.

Plastic Products Co.
371 S. Main
P.O. Box 1415
Salt Lake City 10, Utah

Plastic Supply Co.
2901 N. Grand Blvd.
St. Louis 7, Mo.

Proto Tools
2209 Santa Fe Ave.
Los Angeles 54, Calif.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Stanley Electric Tool Div.
New Britain, Conn.

DRILLS, TAPERED FOR PLASTICS

Elbar Products
2348 E. 17th St.
Brooklyn 29, N. Y.

DRILLS, TWIST

Plastic Parts & Sales
1157 S. Kingshighway
Blvd.
St. Louis 10, Mo.

Plastic Products Co.
371 S. Main.
P.O. Box 1415
Salt Lake City 10, Utah

Plastic Supply Co.
2901 N. Grand Blvd.
St. Louis 7, Mo.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

DRIVES, MACHINE TOOL

Lima Electric Motor Co.
Lima, Ohio

ELECTRIC EQPT. AND SUPPLIES
(see also radio equip.)

Allied Radio Corp.
833 W. Jackson Blvd.
Chicago 7, Illinois.

The Gearon Co.
27 S. Desplaines St.
Chicago 6, Illinois

Gyro Lamp & Shade Corp.
5402 N. Clark St.
Chicago 40, Ill.

Ohmite Mfg. Co.
4835 W. Flournoy St.
Chicago 44, Ill.

Universal Scientific Co.
1102 Shelby St.
Vincennes, Ind.

ELECTRIC MOTORS
(see motors)

ELECTRONIC EQPT.

Allied Radio Corp.
833 W. Jackson Blvd.
Chicago 7, Ill.

Electronic Instrument Co.
84 Withers St.
Brooklyn 11, N. Y.

Ohmite Mfg. Co.
4835 W. Flournoy St.
Chicago 44, Ill.

Universal Scientific Co., Inc.
1102 Shelby St.
Vincennes, Ind.

FILES, HAND

Belsaw Machine Co.
315 Westport Rd.
Kansas City 2, Mo.

Henry Disston & Sons, Inc.
Tacony, Phil. 35, Pa.

Proto Tools
2209 S. Santa Fe Ave.
Los Angeles 54, Calif.

Fayette R. Plumb, Inc.
4837 James St.
Philadelphia 37, Pa.

Severance Tool Ind., Inc.
694 Iowa St.
Saginaw, Mich.

Simonds Saw & Steel Co.
470 Main St.
Fitchburg, Mass.

FILING MACHINES

Belsaw Machine Co.
315 Westport Rd.
Kansas City 2, Mo.

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Henry Disston & Sons Inc.
Tacony, Phil. 35, Pa.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

FLEXIBLE SHAFT MACHINES

Foredom Electric Co.
27 Park Place
New York 7, N. Y.

FORGE TOOLS

Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio

Crescent Tool Co.
Jamestown, N. Y.

Proto Tools
2209 S. Santa Fe Ave.
Los Angeles 54, Calif.

Stanley Tools
New Britain, Conn.

FOUNDRY EQPT.

McEnglevan Heat Treating & Mfg. Co.
702-706 E. Griggs St.
Danville 1, Ill.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

FURNACES, SHOP

Clayton & Lambert Mfg. Co.
1701 Dixie Highway
Louisville 10, Ky.

Harper Electric Furnace Corp.
39 River St.
Buffalo 2, N. Y.

Electric Hotpack Co., Inc.
Cottman Ave. at Melrose
Philadelphia 35, Pa.

McEnglevan Heat Treating & Mfg. Co.
702-706 E. Griggs St.
Danville 1, Ill.

Western Materials Co.
39 South La Salle St.
Chicago 3, Ill.

GAGES, METALWORKING

Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.

Proto Tools
2206 Santa Fe Ave.
Los Angeles 54, Calif.

L. S. Starrett Co.
Crescent St.
Athol, Mass.

GAGES, WOODWORKING

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

The Lufkin Rule Co.
1730 Hess St.
Saginaw, Mich.

The L. S. Starrett Co.
Crescent St.
Athol, Mass.

GLUE POTS

American Type Founders, Inc.
200 Elmora Ave.
Elizabeth 8., N. J.

Bradhead-Garratt Co.
4560 E. 71st St.
Cleveland 5, Ohio

Oliver Machinery Co.
1025 Clancy Ave., NE
Grand Rapids 2, Mich.

GLUES, CEMENTS

Amer. Handicrafts Co.
45-49 S. Harrison St.
East Orange, N. J.

The Borden Company
Chemical Div.
350 Madison Ave.
New York 17, N.Y.

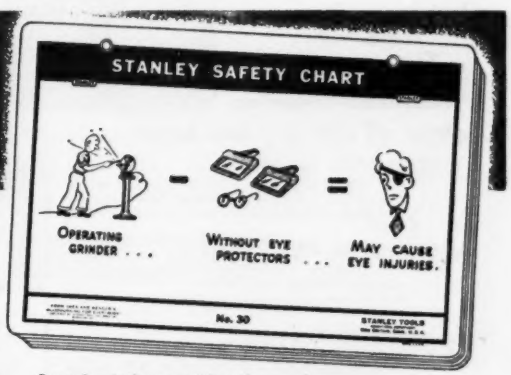
Bradhead-Garratt Co.
4560 E. 71st St.
Cleveland 5, Ohio

Craftsman Supply House
35 Browns Ave.
Scottsville, N. Y.

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Franklin Glue Co.
119 W. Chestnut St.
Columbus 15, Ohio

Stanley Safety Charts



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It is important that your students – the skilled tool users of tomorrow – be trained in ways of safety as they learn the use of tools and machinery. These charts put this idea across with simple, graphic emphasis. To promote safety in schools, as well as in future work, Stanley offers this series of charts at cost of printing and postage. No finer investment could be made in school shop training. ORDER A SET TODAY!

In each set, there are 18 cards, printed in colors on two sides – 36 charts in all. Charts are mounted on heavy cardboard, lacquered for easy cleaning, and have metal grommets for hanging.

$2.50 postpaid in the U.S.A. In Canada*, $4.10 a set postpaid.

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STANLEY

Reg. U. S. Pat. Off.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

Stanley Tools, Educational Dept., 105 Elm St., New Britain, Conn.

Enclosed is $2.50. Please send postpaid the complete set of STANLEY SAFETY CHARTS. (*In Canada $4.10 postpaid. Check or Money Order payable in Canadian Funds must accompany order. Shipment to be made from Stanley Tool Co. of Canada, Ltd., Roxton Pond, Quebec.)

Name _____

Subject You Teach _____

School Name _____

City _____ State _____

Monite Waterproof Glue Co.
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Minneapolis, Minn.

Plastic Parts & Sales
1157 S. Kingshighway
St. Louis 10, Mo.

Plastic Supply Co.
2901 Grand Blvd.
St. Louis 7, Mo.

Rogers Isinglass Glue Co.
Gloucester, Mass.

Russo Handicraft Supplies
245 S. Spring St.
Los Angeles 12, Calif.

GOGGLES, SAFETY

Watchemoket Optical Co.
232 W. Exchange St.
Providence 3, R. I.

GRINDERS, CENTERLESS

Cincinnati Milling Machine Co., Cincinnati Grinders, Inc.
4701 Marburg Ave.
Cincinnati 9, Ohio

The Porter-Cable Machine Co.
1714 N. Salina St.
Syracuse 8, New York

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

GRINDERS, PORTABLE ELECTRIC

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.

Dremel Mfg. Co.
2420 18th St.
Racine, Wis.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 18, Ill.

Foredom Electric Co.
27 Park Place
New York 7, N. Y.

Millers Falls Co.
Greenfield, Mass.

Plastic Supply Co.
2901 N. Grand Blvd.
St. Louis 7, Mo.

Porter-Cable Mach. Co.
1714 N. Salina St.
Syracuse 8, N. Y.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

GRINDERS, PRODUCTION, SURFACE, AND TOOL
(see also grinders, portable: grinders, toolpost)

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Boyar-Schultz Corp.
2102 Walnut St.
Chicago 12, Ill.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Chicago Wheel & Mfg. Co.
1101 West Monroe
Chicago 7, Illinois

Cincinnati Milling Machine Co., Cincinnati Grinders, Inc.
4701 Marburg Ave.
Cincinnati 9, Ohio

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Kearney & Trecker Corp.
6784 W. National Ave.
Milwaukee 14, Wis.

R. K. LeBlond Machine Tool Co.
Madison & Edwards Rd.
Cincinnati 8, Ohio

Lima Electric Motor Co.
Lima, Ohio

Millers Falls Co.
Greenfield, Mass.

Oliver Machinery Co.
1025 Clancy Ave., NE.
Grand Rapids 2, Mich.

Porter-Cable Machine Co.
1714 N. Salina St.
Syracuse, N. Y.

Rockwell Mfg. Co. Delta Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.

Walker-Turner Div. Kearney & Trecker Corp.
Plainfield, N. J.

GRINDERS, TOOLPOST

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

HACKSAWS, HAND
(see also hand tools)

Amer. Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

E. C. Atkins & Co.
402 S. Illinois St.
Indianapolis 9, Ind.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Henry Disston & Sons, Inc.
Tacony, Phil. 35, Pa.

Millers Falls Co.
Greenfield, Mass.

Proto Tools
2209 Santa Fe Ave.
Los Angeles 54, Calif.

Simonds Saw & Steel Co.
470 Main St.
Fitchburg, Mass.

L. S. Starrett Co.
Crescent St.
Athol, Mass.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

HACKSAWS, POWER

Henry Disston & Sons, Inc.
Tacony, Phil. 35, Pa.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

L-W Chuck Co.
24 St. Clair St.
Toledo, Ohio

Simonds Saw & Steel Co.
470 Main St.
Fitchburg, Mass.

The L. S. Starrett Co.
Athol, Mass.

HAMMERS, METALWORKING

Amer. Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

Metal Crafts Supply Co.
10 Thomas St.
Providence 3, R. I.

Proto Tools
2209 Santa Fe Ave
Los Angeles 54, Calif.

Fayette R. Plumb, Inc.
4837 James St.
Philadelphia 37, Pa.

Stanley Tools
New Britain, Conn.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

HAMMERS, WOODWORKING

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Fayette R. Plumb, Inc.
4837 James St.
Philadelphia 37, Pa.

Stanley Tools
New Britain, Conn.

HAND TOOLS, MACHINE SHOP
(see also hand tools, mechanics)

Amer. Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

Billings & Spencer Co.
1 Laurel St.
Hartford 1, Conn.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.

The Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio

Crescent Tool Co.
Jamestown, N. Y.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.

Millers Falls Co.
57 Wells St.
Greenfield, Mass.

Proto Tools
2206 Santa Fe Ave.
Los Angeles 54, Calif.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Stanley Tools
New Britain, Conn.

L. S. Starrett Co.
Crescent St.
Athol, Mass.

J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

HAND TOOLS, MECHANICS

Armstrong Bros. Tool Co.
5252 W. Armstrong Ave.
Chicago 30, Ill.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.

The Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio

Crescent Tool Co.
Jamestown, N. Y.

Henry Disston & Sons, Inc.
Tacony, Phil. 35, Pa.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 18, Ill.

The Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.

Millers Falls Co.
57 Wells St.
Greenfield, Mass.

North Brothers Mfg. Co.
Lehigh and American
Philadelphia 33, Pa.

Proto Tools
2209 Santa Fe Ave.
Los Angeles 54, Calif.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Stanley Tools
New Britain, Conn.

Utica Drop Forge & Tool Corp.
2415 Whitesboro St.
Utica 4, N. Y.

Weller Electric Corp.
808 Packer St.
Easton, Pa.

J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

HAND TOOLS, WOODWORKING

Adjustable Clamp Co.
405 N. Ashland Ave.
Chicago 22, Illinois

American Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.

The Cincinnati Tool Co.
4059 Montgomery Rd.
Cincinnati 12, Ohio

Craft Service
337 University Ave.
Rochester 7, N. Y.

Craftsman Supply House
35 Browns Ave.
Scottsville, N. Y.

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Henry Disston & Sons
Tacony, Phil. 35, Pa.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 18, Ill.

SHELDON
CHICAGO U. S. A.

***Important*★**

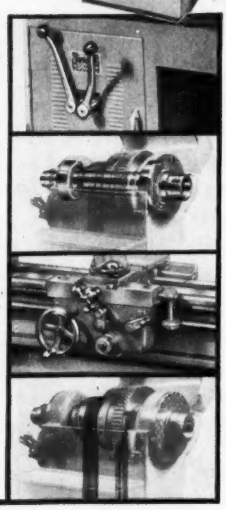
above all else in school lathes

★SHELDON SAFETY
. . . all belts, pulleys, countershafts, gears and motors are completely enclosed. Speed changes and gear-ratio changes are made by external shift levers.

★SHELDON PRECISION
. . . Timken "Zero-Precision" Tapered Roller Spindle Bearings (the absolute in accuracy) permit student work to ten-thousandths of an inch, and hold this accuracy without constant maintenance.

★SHELDON CONTROLS
SHELDON-taught students are ready to operate standard industrial lathes—are familiar with standard controls and the "big lathe feel".

★SHELDON CAPACITY
The extra swing and greater collet capacity increase the range of possible student projects—from the "playing store" group to the practical. The extra power to the spindle, the speed range, weight and strength of SHELDON Precision Lathes permit heavy cuts, spinning and demonstration of correct use of new cast-alloy and carbide-tipped cutters.



Built by modern methods, with the finest machine-tool special machinery, on a continuous production line basis, these better lathes cost little more than ordinary school type lathes. *Write for Catalog*

SHELDON MACHINE CO., INC.
4260 North Knox Ave., Chicago 41, Illinois

Greenlee Tool Co.
2136 Twelfth St.
Rockford, Ill.

Millers Falls Co.
Greenfield, Mass.

Red Devil Tools
130 Coit St.
Irvington 11, N. J.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Stanley Tools
New Britain, Conn.

X-acto Crescent Prod. Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

HARDWARE SUPPLIES

Amer. Handicrafts Co.
45-49 S. Harrison St.
East Orange, N. J.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Henry Disston & Sons, Inc.
Tacony, Phil. 35, Pa.

The Gearon Co.
27 S. Desplaines St.
Chicago 6, Illinois

Gyro Lamp & Shade Corp.
5402 N. Clark St.
Chicago 40, Ill.

The Lufkin Rule Co.
1730 Hess St.
Saginaw, Mich.

JIG SAWS
(see saws, jigs)

KNIVES, SLOYD, CRAFT

Amer. Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

X-acto Crescent Products Co.
440 Fourth Ave.
New York 16, N. Y.

LATHES, ENGINE

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Cincinnati Lathe & Tool Co.
Oakley, Cincinnati 9, Ohio

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

R. K. LeBlond Machine Tool Co.
Madison & Edwards Rd.
Cincinnati 8, Ohio

Logan Engineering Co.
4801 W. Lawrence Ave.
Chicago 30, Ill.

Sheldon Machine Co.
4240 N. Knox Ave.
Chicago 41, Ill.

South Bend Lathe Works
425 E. Madison St.
South Bend 22, Ind.

LATHES, TURRET
(Includes screw machines)

R. K. LeBlond Machine Tool Co.
Madison & Edwards Rds.
Cincinnati 8, Ohio

Logan Engineering Co.
4801 W. Lawrence Ave.
Chicago 30, Ill.

Sheldon Machine Co., Inc.
4240 N. Knox Ave.
Chicago 41, Illinois

South Bend Lathe Works
425 E. Madison St.
South Bend 22, Ind.

LATHES, WOODWORKING

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Dura Metal Prod. Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Magna Engineering Corp.
Menlo Park, Calif.

Oliver Machinery Co.
1025 Clancy Ave., N.E.
Grand Rapids 2, Mich.

Rockwell Mfg. Co. Delta Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.

Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.

Walker-Turner Div. Kearney & Trecker Corp.
Plainfield, N. J.

J. D. Wallace & Co.
170 S. California Ave.
Chicago 12, Ill.

LEVELS

Columbian Vise & Mfg. Co.
Stevens Level Div.
9021 Bessemer Ave.
Cleveland 4, Ohio

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Henry Disston & Sons Tacony, Phil. 35, Pa.

Millers Falls Co.
Greenfield, Mass.

South Bend Lathe Works
425 E. Madison St.
South Bend 22, Ind.

Stanley Tools
New Britain, Conn.

The L. S. Starrett Co.
Crescent Street
Athol, Mass.

LUMBER
(see also woodshop supplies)

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Craftsman Wood Service Co.
2729 S. Mary St.
Chicago 8, Ill.

Hardwood Corp. of America
Asheville, N. C.

The Tolerton Co.
265 N. Freedom Ave.
Alliance, Ohio

MACHINE SHOP EQPT. & SUPPLIES

Armstrong Bros. Tool Co.
5252 W. Armstrong Ave.
Chicago 30, Ill.

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Boyar-Schultz Corp.
2102 Walnut St.
Chicago 12, Ill.

Brodhead-Garrett Co., Inc.
4560 E. 71st St.
Cleveland 5, Ohio

Canedy-Otto Div., Cincinnati Lathe & Tool Co.
3207 Disney Ave.
Cincinnati 9, Ohio

Cincinnati Lathe & Tool Co.
3207 Disney Ave.
Oakley, Cincinnati 9, Ohio

The Cincinnati Milling Machine Co., Cincinnati Grinders, Inc.
4701 Marburg Ave.
Cincinnati 9, Ohio

Cincinnati Shaper Co.
Hopple & Garrard St.
Cincinnati 25, Ohio

Crescent Tool Co.
Jamestown, N. Y.

Dake Engine Co.
620 Seventh St.
Grand Haven, Mich.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Greaves Machine Tool Co.
2011 Eastern Ave.
Cincinnati, Ohio

Kearney & Trecker Corp.
6784 W. National Ave.
Milwaukee 14, Wis.

R. K. LeBlond Machine Tool Co.
Madison & Edwards Rd.
Cincinnati 8, Ohio

Lima Electric Motor Co.
Lima, Ohio

Logan Engineering Co.
4801 W. Lawrence Ave.
Chicago 30, Ill.

Raymac Mfg. Co.
3729 Cass Ave.
Detroit 1, Mich.

E. H. Sheldon & Co.
Muskegon, Mich.

Sheldon Machine Co., Inc.
4240 N. Knox Ave.
Chicago 41, Ill.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Wells Mfg. Corp.
2600 Shop Ave.
Three Rivers, Mich.

MACHINE TOOL ATTACHMENTS

Armstrong Bros. Tool Co.
5252 W. Armstrong Ave.
Chicago 30, Ill.

Atlas Press Co.
1936 N. Pitcher
Kalamazoo, Mich.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Cincinnati Milling Machine Co., Cincinnati Grinders, Inc.
4701 Marburg Ave.
Cincinnati 9, Ohio

Dura Metal Products Co.
2649 N. Kildare Ave.
Chicago 1, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Kearney & Trecker Corp.
6784 W. National Ave.
Milwaukee 14, Wis.

R. K. LeBlond Machine Tool Co.
Madison & Edwards Rd.
Cincinnati 8, Ohio

Lima Electric Motor Co.
Lima, Ohio

Logan Engineering Co.
4801 W. Lawrence Ave.
Chicago 30, Ill.

L-W Chuck Co.
24 St. Clair St.
Toledo, Ohio

Sheldon Machine Co., Inc.
4260 Knox Ave.
Chicago 41, Ill.

MACHINE TOOLS, WOOD AND METAL
(see machine wanted)

MACHINES, TESTING

National Forge & Ordnance Co.
Irvine,
Warren County, Pa.

MEASURING TOOLS, PRECISION
(see also tool wanted)

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.

George Scherr & Co.
200 Lafayette St.
New York, N. Y.

L. S. Starrett Co.
Crescent Street
Athol, Mass.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

MECHANICAL DRAWING
(see drafting)

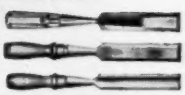
MELTING POTS

Clayton & Lambert Mfg. Co.
1701 Dixie Highway
Louisville 10, Ky.

Better shopwork with fine tools by GREENLEE

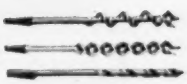
CHISELS, GOUGES, TURNING TOOLS

Tough, lasting fine cutting edges for all types of woodworking. Various types of socket butt and firmer chisels with "Hardwear" green plastic or hickory handles. Outside or inside bevel socket gouges. Short and full length turning tools.



AUGER BITS, CAR BITS AND DRILLS

There's a GREENLEE for every need . . . all types of twists and heads. Accurately sized, perfect cutting edges. Line includes the famous "Greenlee 22" Solid-Center Auger Bits which come to you "Plastic Sealed" for factory-sharp edges.



EXPANSIVE BITS

Fast, easy-boring Expansive Bits with free, positive chip clearance. Specially-designed wide, open throat assures smooth, uninterrupted action. In two styles — Setfast with quick adjusting-locking feature and Plain.

SPIRAL SCREWDRIVERS AND AUTOMATIC PUSH DRILLS

GREENLEE Spiral Screw Drivers are sturdily constructed and have special phosphor bronze drive nuts for long, hard service. Beautifully finished, three sizes. Automatic Push Drills have completely enclosed working parts and phosphor bronze drive nuts. Handle holds eight points. Chromium plated.

The GREENLEE line also includes Bit Extensions, Razor-Blade Draw Knives, Ship Augers, Electricians' Bits, Hand Benders for Tubing, Radio Chassis Punches, Knockout Tools and many other timesaving tools for the shop worker and the student.

TOOLS FOR CRAFTSMEN
GREENLEE

Free Folder H-301 with complete data on GREENLEE hand tools for the woodworker. Write Greenlee Tool Co., Division of Greenlee Bros. & Co. 2044 Twelfth Street, Rockford, Illinois. U. S. A.

METALWORKING SUPPLIES

American Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

American Products Corp.
422 S. Dearborn
Chicago, Ill.

Berkray Products, Inc.
2516 N. Ontario St.
Burbank, Calif.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Craft Service
337 University Ave.
Rochester 7, N. Y.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Metal Crafts Supply Co.
10 Thomas St.
Providence 3, R. I.

Metal Goods Corp.
5239 Brown Ave.
St. Louis 15, Mo.

Metallizing Engr. Co.
Long Island City, N. Y.

Metal Supply, Inc.
566 S. Clinton Ave.
Rochester 7, N. Y.

South Bend Lathe Works
425 E. Madison St.
South Bend 22, Ind.

MICROMETER CALIPERS

Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.

Millers Falls Co.
Greenfield, Mass.

L. S. Starrett Co.
Crescent Street
Athol, Mass.

MILLING MACHINES

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Cincinnati Milling Machine Co., Cincinnati Grinders, Inc.
4701 Marburg Ave.
Cincinnati 9, Ohio

Greaves Machine Tool Co.
2011 Eastern Ave.
Cincinnati, Ohio

Kearney & Trecker Corp.
6784 W. Nat'l Ave.
Milwaukee 14, Wis.

L-W Chuck Co.
24 St. Clair St.
Toledo, Ohio

Sheldon Machine Co., Inc.
4258 N. Knox Ave.
Chicago 41, Ill.

MODELS

Monogram Models, Inc.
Dept. 44, 225 N. Racine Ave., Chicago 7, Ill.

MORTISERS, WOODWORKING

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 18, Ill.

Greenlee Bros. & Co.
2136 Twelfth St.
Rockford, Ill.

Oliver Machinery Co.
1025 Clancy Ave., NE
Grand Rapids 2, Mich.

Porter-Cable Machine Co.
1714 N. Salina St.
Syracuse 8, N. Y.

Rockwell Mfg. Co. Delta-Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.

MOTORS, ELECTRIC

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Brodhead-Garrett Co., Inc.
4560 E. 71st St.
Cleveland 5, Ohio

Lima Electric Motor Co.
Lima, Ohio

Rockwell Mfg. Co. Delta Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.

PAINTING EQPT., SPRAY

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

PAINTS, FINISHES

Brodhead-Garrett Co., Inc.
4560 E. 71st St.
Cleveland 5, Ohio

DonJer Products Co.
51-47 69th St.
Woodside, Long Island, N. Y.

General Finishes Sales & Service
1548 W. Bruce St.
Milwaukee 46, Wis.

PLANERS & JOINTERS, WOODWORKING

Atlas Press Co.
1936 N. Pitcher St.
Kalamazoo, Mich.

Belsaw Mach. Co.
315 Westport, Rd.
Kansas City 2, Mo.

Boice-Crane Co.
930 Central Ave.
Toledo 6, Ohio

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Buss Machine Works
Holland, Mich.

Duro Metal Prod. Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

Greenlee Bros. & Co.
2136 Twelfth St.
Rockford, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Oliver Machinery Co.
1025 Clancy Ave., NE
Grand Rapids 2, Mich.

Parks Woodworking Machine Co.
1501 Knowlton St.
Cincinnati, Ohio

Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.

Rockwell Mfg. Co. Delta Power Tool Div.
600 E. Vienna Ave.
Milwaukee 1, Wis.

Stanley Tools
New Britain, Conn.

J. D. Wallace Co.
170 S. California Ave.
Chicago 12, Ill.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

PLANES, HAND

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

Millers Falls Co.
Greenfield, Mass.

The Porter-Cable Machine Co.
1714 N. Salina St.
Syracuse 8, N. Y.

Stanley Tools
New Britain, Conn.

X-acto Crescent Prod. Co., Inc.
440 Fourth Ave.
New York 16, N. Y.

PLASTICS

Amer. Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

Brodhead-Garrett Co.
Cleveland 5, Ohio

Cadillac Plastic Co.
15115 Second Blvd.
Detroit 3, Mich.

Commercial Plastics & Supply Corp.
630 Broadway
New York, N. Y.

D. W. Cope—Plastics
9833 Highway 99
St. Louis 21, Mo.

Craft Service
337 University Ave.
Rochester 7, N. Y.

Craftsman Supply Hse.
35 Browns Ave.
Scottsville, New York

Petersen Bros.
3823 N. Southport Ave.
Chicago 13, Ill.

Plastic Parts & Sales
1157 S. Kingshiway
St. Louis 10, Mo.

Plastic Products Co.
P.O. Box 1415
371 S. Main St.
Salt Lake City 11, Utah

Plastic Supply Co.
2901 N. Grand Blvd.
St. Louis 7, Mo.

PLIERS

Utica Drop Forge & Tool Corp.
2415 Whitesboro St.
Utica 4, N. Y.

PROJECTORS AND EQUIPMENT

Jam Handy Organization
2821 E. Grand Blvd.
Detroit 11, Mich.

PLYWOOD
(see also lumber)

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.

PORTABLE ELECTRIC TOOLS
(see also tool wanted)

American Handicrafts Co., Inc.
45-49 S. Harrison St.
East Orange, N. J.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Chicago Wheel & Mfg. Co.
1101 W. Monroe St.
Chicago 7, Ill.

D. W. Cope Plastics
9833 Highway 99
St. Louis 21, Mo.

Duro Metal Prod. Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Millers Falls Co.
57 Wells St.
Greenfield, Mass.

Plastic Parts & Sales
1157 S. Kingshiway
St. Louis 10, Mo.

Plastic Products Co.
371 S. Main St.
Salt Lake City 11, Utah

Plastic Supply Co.
2901 N. Grand Blvd.
St. Louis 7, Mo.

Porter-Cable Machine Co.
1714 N. Salina St.
Syracuse 8, N. Y.

Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.

Stanley Electric Tool Div.
The Stanley Works
New Britain, Conn.

PRECISION EQPT.
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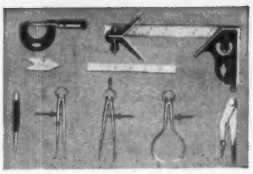

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425 E. Madison St.
South Bend 22, Ind.
J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N. Y.

VISES, MACHINE SHOP
The Billings & Spencer Co.
1 Laurel St.
Hartford 1, Conn.
Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio
The Cincinnati Milling Machine Co., Cincinnati Grinders, Inc.
4701 Marburg Ave.
Cincinnati 9, Ohio
Columbian Vise & Mfg. Co.
9021 Bessemer Ave.
Cleveland 4, Ohio
Kearney & Trecker Corp.
6784 W. National Ave.
Milwaukee 14, Wis.
Millers Falls Co.
Greenfield, Mass.
Morgan Vise Co.
114 N. Jefferson St.
Chicago 6, Ill.
North Bros. Mfg. Co.
Lehigh & American
Philadelphia 33, Pa.
E. H. Sheldon & Co.
Muskegon, Mich.
Sheldon Machine Co.
4240 N. Knox Ave.
Chicago 41, Ill.
Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.

VISES, WOODWORKING
Brodhead-Garret Co.
4560 E. 71st St.
Cleveland 5, Ohio
Columbian Vise & Mfg. Co.
9021 Bessemer Ave.
Cleveland 4, Ohio
Craftsman Wood Service Co.
2727 S. Mary St.
Chicago 8, Ill.
Morgan Vise Co.
114 N. Jefferson St.
Chicago 6, Ill.
E. H. Sheldon & Co.
Muskegon, Mich.
Stanley Tools
New Britain, Conn.
Will-Burt Co.
Oreville, Ohio

WOODSHOP SUPPLIES
(see also item wanted)
"Dowl-It" Co.
515 N. Hanover St.
Hastings, Mich.
General Finishes Sales & Service Co.
1548 W. Bruce St.
Milwaukee 4, Wis.
Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.
Junior-Pro Products Co.
3206 Morganford Rd.
St. Louis 16, Mo.
The Lufkin Rule Co.
1730 Hess Ave.
Saginaw, Mich.
Monite Waterproof Glue Co.
1628 N. 2nd St.
Minneapolis, Minn.
Red Devil Tools
130 Coit St.
Irvington 11, N.J.
Rogers Isinglass & Glue Co.
Gloucester, Mass.
Skilsaw, Inc.
5033 Elston Ave.
Chicago 30, Ill.
Timber Eng. Co.
1319 18th St. N.W.
Washington 6, D.C.
Wetzler Clamp Co.
43-15 11th St.
Long Island City 1, N.Y.

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Capacity in inches: Rounds Rectangular	3½ 3½ x 6	5 5 x 10	8 8 x 16	12¾ 12 x 16
Blade speeds, ft. per min.	84, 100, 190	60, 90, 130	60, 90, 130	50, 100, 150
Motor Size	1/6 H.P.	½ H.P.	½ H.P.	¾ H.P.
Floor Space, in inches	18½ x 38	21 x 50	24 x 72	32 x 78
Wet cutting system	No	Yes	Yes	Yes

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Atlas Press Co.
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Kalamazoo, Mich.

Boice-Crane Co.
930 Central Ave.
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Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Buss Machine Works
Holland, Mich.

"Dowl-It" Co.
515 N. Hanover St.
Hastings, Mich.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

Greenlee Bros. & Co.
2136 Twelfth St.
Rockford, Ill.

Howard & Smith, Inc.
14255 Schaefer Rd.
Detroit 27, Mich.

Magna Engineering Corp.
Menlo Park, Calif.

Oliver Machinery Co.
1025 Clancy Ave., NE
Grand Rapids 2, Mich.

Parks Woodworking Machine Co.
1501 Knowlton St.
Cincinnati 23, Ohio

Red Devil Tools
130 Coit St.
Irvington 11, N.J.

Shopmaster, Inc.
1214 S. 3rd St.
Minneapolis 15, Minn.

Skilsaw, Inc,
5033 Elston Ave.
Chicago 30, Ill.

Syncro Corp.
Oxford, Mich.

Walker-Turner Div. Kearney & Trecker Corp.
Plainfield, N. J.

Wetzler Clamp Co.
43-15 11th St.
Long Island City 1, N.Y.

Woodworkers' Tool Works
222 S. Jefferson St.
Chicago 6, Ill.

J. D. Wallace Co.
170 S. California Ave.
Chicago 12, Ill.

X-acto Crescent Products Co., Inc.
440 Fourth Ave.
New York 16, N.Y.

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Allied Radio Corp.
833 W. Jackson Blvd.
Chicago 7, Ill.

Armstrong Bros. Tool Co.
5252 W. Armstrong Ave.
Chicago 30, Ill.

The Billings & Spencer Co.
1 Laurel St.
Hartford 1, Conn.

Brodhead-Garrett Co.
4560 E. 71st St.
Cleveland 5, Ohio

Crescent Tool Co.
Jamestown, N.Y.

Duro Metal Products Co.
2649 N. Kildare Ave.
Chicago 39, Ill.

North Bros. Mfg. Co.
Lehigh & American
Philadelphia, Pa.

Proto Tools
2206 Santa Fe Ave.
Los Angeles 54, Calif.

Utica Drop Forge & Tool Corp.
2415 Whitesboro St.
Utica 4, N.Y.

J. H. Williams & Co.
400 Vulcan St.
Buffalo 7, N.Y.

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ABOUT YOUR FELLOW TEACHERS

A. K. GETMAN, New York State assistant commissioner for vocational education, has retired after 41 years in public education.

FRANK B. CALE, formerly state supervisor of agricultural education, has been appointed state director of vocational education for Virginia.

STUART ANDERSON, associate professor of education at The Stout Institute, Menomonie, Wis., has been named director of the industrial-education program of the cooperative education project sponsored jointly by the Institute of Inter-American Affairs and the Peruvian Ministry of Education with headquarters in Lima, Peru.

ROGERS L. BARTON, assistant professor of industrial education at Texas A & M College, has been appointed industrial-arts consultant with the Texas Education Agency, Austin.

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• 54 SO. HARRISON ST. EAST ORANGE, N. J. • 19 EAST 47th STREET NEW YORK 17, N. Y.

JOHN J. SMITH, Hamilton High School, Trenton, N. J., has been named state supervisor of industrial arts for New Jersey, succeeding ROBERT A. CAMPBELL who retired.

ROY L. DAVENPORT, director of the school of vocational education at Louisiana State University and A & M College, Baton Rouge, is serving as a vocational-education specialist for the U. S. Government in Wuerttemberg-Baden, Germany.

ROY V. ORENDORF, Glen Falls, N. Y., High School, has been named associate in industrial arts education, New York State Education Department.

WILLIAM G. CARR will succeed WILLARD E. GIVENS as executive secretary of the National Education Association, Washington, D. C., on August 1 when the latter retires.

EDWARD I. PHILLIPS is the new principal of the Jane Addams Vocational High School, Bronx, New York City.

SIDNEY C. HIGH, JR., Hugh Morson High School, Raleigh, N. C., has been appointed industrial-education specialist for the Economic Cooperation Administration, Manila, Philippine Islands. He has been serving as a specialist in industrial arts under the Fulbright plan in establishing a model industrial-arts laboratory at the Philippine School of Arts and Trades. He is planning to return to the states in the fall of 1953 with his bride, the former Miss Elizabeth Heussler of Dietikon, Switzerland, who is a member of the Swiss consular staff in Manila.

A. LESTER CUNNINGHAM has been appointed director of vocational education for the Gary, Ind., schools. JOHN J. MATTHEWS, former director, resigned to accept an appointment with the Institute of Inter-American Affairs in Brazil.

C. M. ELLIOTT, formerly vice-president and secretary of the American School, Chicago, Ill., has been elected president of the 55-year-old home-study institution and executive vice-president of the American Technical Society, vocational publishers. He succeeds JAMES MCKINNEY who was elected chairman of the Board of Trustees. E. C. ESTABROOKE has been named secretary of the American School.

O. M. MERRIMAN has retired as director of vocational education for the Whiting, Ind., schools.

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Ball State Teachers College (Henry Gorzynski, Richard T. Warner), **cover 1; 17; 23** *top, bottom;* **28** *top, bottom—middle;* **31; 39; 48** *top.*
Chicago Public Schools, **15.**
Hobart Bros. Co., Troy, Ohio, **28** *bottom—left.*
National Safety Council, **10; 13; 14; 35** *bottom.*
San Francisco Public Schools, **7; 33; 35** *top.*
University of Michigan News Service (Maitland LaMotte), **48** *bottom.*
Western Michigan College, **37.**

Convention Calendar

Texas Vocational Association, Shamrock Hotel, Houston, April 3-5.
Illinois Vocational Association, Congress Hotel, Chicago, April 3-5.
New York State Vocational and Practical Arts Association, Hotel Syracuse, Syracuse, N. Y., April 3-5.
California Industrial Education Association, Laney Trade and Technical Institute, Oakland, April 4-5.
Michigan Industrial Education Society, Municipal Auditorium, Grand Rapids, April 17-19.
Missouri Annual Industrial Education Spring Conference, Columbia, April 18-19.
Connecticut Industrial Arts Association, Teachers College of Connecticut, New Britain, April 18-19.
American Industrial Arts Association, Congress Hotel, Chicago, Ill., April 30-May 1.
Wisconsin Association for Vocational and Adult Education, Loraine Hotel, Madison, May 9-10.
Georgia Vocational Association, Municipal Auditorium, Savannah, June 9-10.
International Graphic Arts Education Association, Madison, Wis., June 29-July 2.
Colorado Vocational Association, Fort Collins, Colo., August 18-20.

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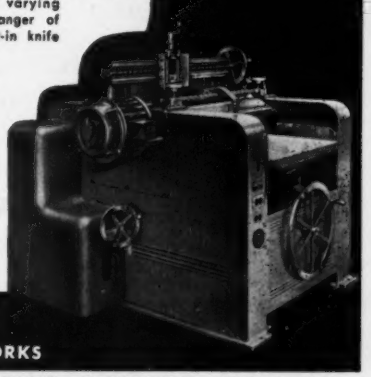

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☐ HAND SAWING	
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Prices F.O.B. Detroit—subject to change without notice. Write for further information about Jam Handy Films. These films may be purchased through a nationwide dealer organization.

New Visual Aids in Industrial Education

Because of the increasing importance of audio-visual aids in shop teaching, SCHOOL SHOP has prepared below a list of latest films, film strips, posters and charts, and projection equipment which have become available since the beginning of the calendar year 1951. When writing please mention SCHOOL SHOP. Where no price for purchase or loan of the aid is given, you may obtain this information when you contact the firm. It is usually desirable to give alternate dates when booking film showings.

Arts and Crafts

American Braiding Craft $3.25, *Ceramics* $3.25, *Leatherwork and Whittling* $3.25, *Native Crafts* $3.25, and *You Can Make Jewelry* (in two parts) $6.25 are new filmstrips issued in 1951 by Chas. A. Bennett Co., Inc., 237 N. Monroe St., Peoria 3, Ill.

Automotive

The Human Bridge, 6000 Partners, Iron Ore to Motive Power, The Big Race, Production Pioneering, The Silent Voice, are all films relating to the development and growth of the automobile industry and available by writing to Community Relations Dept., Ford Motor Co., Dearborn, Mich., or from a local Ford dealer.

Listen Herman, a film describing efficient and economical automobile refinishing, is a 16mm color-sound film running 25 min., 20 sec. Further information may be obtained from the DeVilbiss Co., Toledo 4, Ohio.

Driver Education Series, consisting of six 10 min. films, each portraying a driving lesson developed under the guidance of the National Commission on Safety Education of the NEA. May be obtained through local Ford dealers or from Ford Motor Co., Rotunda, Dearborn, Mich.

Drafting and Mechanical Drawing

Standard Symbols for Wiring, and *Basic Standards in Mechancial Drafting* are new wall charts available to shop instructors from the Eberhard Faber Pencil Co., 37 Greenpoint Ave., Brooklyn 22, N.Y.

Graphic Arts

Pressman's Ink Log in loose-leaf form is available free with the purchase of a copy of Pressman's Ink Manual from Bullingers Guides, Inc., 303 Lafayette St., New York 12, N. Y.

Type and Its Origin, a new 16-min. 96-frame sound slidefilm in color available with 78 or 33⅓ rpm records. It outlines the growth of typography from its beginning. A companion booklet prepared for classroom use is available free. For information write Monsen-Chicago, Inc., Educational Dept., 22 E. Illinois St., Chicago 11, Ill.

Type Specimen Bristol Tracing Cards. Make layout just like completed job in type. The 46 boxed sets are available for $5 each from American Type Founders, 200 Elmora Ave., Elizabeth B., N. J.

Sixteen Steps in the Binding of Books is an attractive illustrated wall chart. The G. A. Pratt Co., 1108 W. Chicago Ave., East Chicago, Ind., will send copies to graphic-arts instructors on request.

Machine Shop and Metalworking

Four filmstrips entitled *Bending and Beating Down Metal, Jointing and Finishing Art Metal, Raising and Surface Decoration,* and *Laying Out, Cutting, Filing, and Drilling,* are available at $3 each from the Chas. A. Bennett Co., Peoria 3, Ill.

(*Continued on next page*)

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How to Become a Machinist, Decimal Equivalents, Principal Parts of a Lathe, and *Tap Drill Sizes* are four new wall charts available from South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind.

The Metalworking Lathe, Plain Turning, and *Grinding Cutter Bits* are 20-min. black-and-white 16mm sound films available on a free-loan basis from South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind.

For Proper Vise Care, a wall chart, may be had from the Columbian Vise & Mfg. Co., 9021 Bessemer Ave., Cleveland 4, Ohio.

Suggestions on How to Use Clamps, in notebook page form, are available from the Adjustable Clamp Co., 405 N. Ashland Ave., Chicago 22, Ill.

Milling Machine Course filmstrips by Kearney & Trecker Corp., of Milwaukee, Wis., may be had on request for free loan.

Progressive Steps in the Production of a Billings Wrench is a brochure by Billings & Spencer, 1 Laurel St., Hartford 1, Conn.

The Oxy-Acetylene Handbook and the *Welding and Cutting Manual* have been published by the Linde Air Products Company and are now available. For information write Linde Air Products Co., Div. of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N.Y.

Correct Angles for Grinding Tool Bits is a chart by Armstrong Bros. Tool Co., 5252 W. Armstrong Ave., Chicago 30, Ill.

Add Power to Your Hands, and *Pliers: Their Care and Uses,* two 10-min. 16mm black-and-white sound films available free from Utica Drop Forge & Tool Corp., 2415 Whitesboro, Utica, N.Y.

Wall Charts for School and Industrial Shops. *Decimal Chart,* three-color *Tool Chart, Tap and Drill Chart* in black and red ink on white background, and *Micrometer Chart* (blueprint type). Free to shop instructors or directors from L. S. Starrett Co., Athol, Mass.

Starrett Tool Blueprint Charts. 15 wall-size charts 14¾" x 18¾" showing Starrett tools and their applications, suitable for framing or mounting. Free to shop instructors or directors. Notebook size also available. L. S. Starrett Co., Athol, Mass.

The Tools and Rules for Precision Measuring, a film running 30 min. showing the latest methods and equipment including how precision tools control quality in production, will be loaned without charge by writing to L. S. Starrett Co., Athol, Mass.

Hack Saws and How to Use Them, and *A Study of Metal Band Saws and Flat Ground Stock,* two movies available for free showing from factory branches of Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

Petroleum

Men and Oil is a brief documentary film on petroleum from discovery through refining, and *Gasoline's Amazing Molecules* is a 22½ min. 16mm color sound movie, covering the production and properties of gasoline. Both are available at cost of transportation from Modern Talking Picture Service, 142 E. Ontario St., Chicago 11, Ill. Presented by Standard Oil Co., of Indiana.

Photography

Photographic Darkroom Procedures in a series of six silent filmstrips are available from McGraw-Hill Book Co., Text-Film Department, 330 W. 42nd St., New York 18, N. Y., for $4.50 each or $24.00 for the series. Titles include *Developing Roll Film, Developing Sheet Film and Film Pack, Contact Printing, Projection Printing I and II,* and *Spot Printing and Dodging.*

Plastics

Special instruction books, special school project suggestion books, and loaned samples are available from Plastic Products Co., 371 S. Main St., Box 1415, Salt Lake City 10, Utah.

Radio and TV

Photofact Standard Notation Schematic, size 34" x 44", ready for mounting, and free to instructors of radio and television courses, from Howard W. Sams & Co., Inc., 2201 E. 46th St., Indianapolis 5, Ind.

Woodworking

A DeWalt Demonstration Film in color and sound is now available. Running time is 5 min., and such operations as ripping, shaping, molding, rabbeting, and others are depicted. Available free; write to Dept. P-141, DeWalt, Inc., Lancaster, Pa.

Color Harmony, 18th Century English Furniture, Case Goods Construction, and *Upholstered Furniture Construction* form Series B of the National Retail Furniture Association's "Furniture Films for Homemakers," all in color and sound. Arrange for showings with your local NRFA member or write the Association at 666 Lake Shore Drive, Chicago 11, Ill., for name of nearest dealer.

Filmstrip Series, a series of six filmstrips has been produced by the Popular Science Publishing Co., in conjunction with Walker-Turner Div. of the Kearney & Trecker Corp. Basic operations are shown on the jig saw, drill press, band saw, shaper, and circular saw. Information is available from the Educational Dept., SS2, Walker-Turner Div., Plainfield, N.J.

Faces and Figures is a 28-min. sound-color film portraying methods of processing wood veneers and matching faces. Uses of hardwood veneer and plywood are demonstrated. Obtainable on free loan from the Veneer Association, 600 S. Michigan Ave., Chicago 5, Ill.

Filmstrips on Woodworking have been made available by the Society for Visual Education, Inc., and the Chas. A. Bennett Co., Peoria 3, Ill. Titles are *Furniture Joinery, Making a Project with Handtools, Safety Know-How,* and *Woodworking Machines.* Each filmstrip is $3.00.

Flexibility in Woodworking, featuring the radial saw, and *Your Star Performer,* featuring drill presses are two 20-min. films available on free-loan basis by writing to Rockwell Mfg. Co., Delta Power Tool Div., 600 E. Vienna Ave., Milwaukee 1, Wis.

Machine Knives in Industry is a film produced by Simonds Saw & Steel Co., Fitchburg, Mass.

Miscellaneous

Setting Up Your Audio-Visual Education Program is a handbook prepared at the request of the Secondary-School Principals Assoc. of California by the Society for Visual Education, Inc., 1345 W. Diversey Parkway, Chicago 14, Ill., at $1.00 per copy.

Educators Guide to Free Films $6. *Educators Guide to Free Slidefilms* $3. Educators Progress Service, Randolph, Wis. 100 titles

listed in first volume under "Applied Arts—Shop Work," mostly on metalwork and machine shop. Many titles under "Science" section of both volumes deal with electricity, radio, TV, hydraulics, and automotive engines.

Products and Industries Series includes three sets of six filmstrips of from 40-46 frames each giving the story of a product or industry. Set No. 1: *How We Get Our Iron and Steel, Copper, Cotton, Rubber, Coal, Aluminum.* Set No. 2: *Coffee, Glass, Plastics, Paper, Sugar, Oil.* Set No. 3: *Leather, Wool, Rayon, Gas, Electricity, Cement.* Priced at $16.50 per set from Young America Films, Inc., 18 E. Forty-first St., New York 17, N. Y.

Pride of Workmanship is a 16mm sound film in color, depicting the story of the Industrial Arts Awards program of the Ford Motor Co. Also available is a 35mm slide film called *Craftsmanship Unlimited* covering the program. Both may be secured free from Industrial Arts Awards, Ford Motor Co., 2919 Schaefer Rd., Dearborn, Mich., giving alternate dates for showing.

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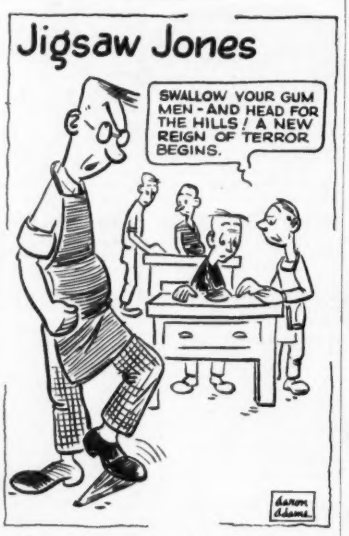
The Wood-Turning Lathe, Haines, *et al.* Van Nostrand.

Miscellaneous

Finishing Materials and Methods. Soderberg. McKnight. $4.00.
Handyman's Guide to Home Repairs. Popular Mechanics Press. $2.50. ★



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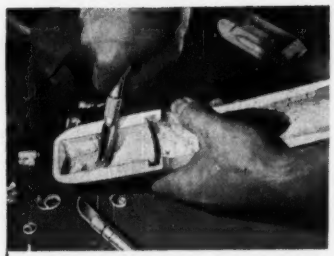
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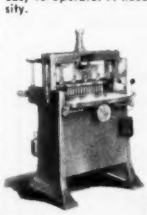
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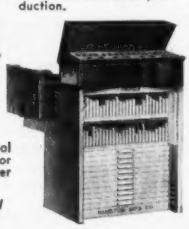
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An Action Program for Shop Safety

TO PROMOTE an adequate program of industrial safety at the secondary-school level, the following recommendations for action are proposed:

1. Accident reporting and analysis—

To avoid multiplicity of accident reporting, standard student accident reporting should be adopted on a system-wide basis. (Blanks are available from the National Safety Council.)

A definite plan should be established locally for the analysis of school-shop accidents.

A state-wide plan for school-shop accident recording and analysis should be adopted.

Summaries of reports and records should be submitted to the National Safety Council for national analysis in *Accident Facts.*

2. School-shop inspections—

Regular and frequent safety inspections should be made of all school shops. Participating in these inspections should be one or more of the following: state department of labor inspectors, state fire inspectors, industrial safety engineers, state and local school personnel, supervisors, teachers, and students.

3. A national standard school-shop safety inspection check list—

A national standard school-shop safety inspection check list should be developed. A definite program for the use of this check list should be established on state and local levels. (This check list has been completed and will be ready for distribution by the National Safety Council in the near future.)

4. A national steering committee for promotion and general program development of school-shop safety—

Such a committee should be charged with the responsibility of carrying forward the recommendations and action program.

5. State-wide school-shop safety committee—

Each state should set up such a committee under the direction of the state superintendent of public instruction, the state director of vocational education, the state director of industrial arts, or a combination of all.

Each committee should work in cooperation with the national steering committee to carry forward the recommendations and action program.

Herewith are the recommendations that came out of the President's Conference on Industrial Safety held at the White House in 1949. Many aids in carrying out the program are available as noted from the National Safety Council, School and College Division, 425 N. Michigan Ave., Chicago 11, Illinois.

6. Local school-shop safety committee—

Such a committee should be established by the local school administrator to cooperate with the national and state committees.

7. Responsibility for safety assigned to state supervisory staff—

A definite program of responsibilities for school-shop safety should be assigned to members of the state supervisory staff.

8. Responsibility for the state's program in school-shop safety vested in one person—

One staff member of the state department of education should be charged with the responsibility for the program of school-shop safety. He should be interested and proficient in the assignment and should be provided with authority and means to carry out the program. He should serve as chairman or secretary of the state committee.

9. Responsibility for the local program in school-shop safety vested in one person—

One member of the local school staff should be charged with the responsibility for the school-shop safety program. He should be interested and proficient in the assignment and should be provided with authority and means to carry out the program. He should serve as chairman or secretary for the local committee.

10. Definite program of teacher preparation—

Preservice: All schools preparing shop teachers should provide a definite program of instruction in school-shop safety.

Inservice: Institutes, workshops, conferences, etc., in school-shop safety should be provided for inservice teachers by the state department of education, by teacher-preparing institutions, or through some local plan.

11. Safety committees in national organizations—

Safety committees should be formed in every national organization which represents all or a segment of the teaching personnel in the industrial-education field.

12. Safety sessions in conventions—

Both general and special sessions should be provided in local, area, state, and national conventions for the discussion of school-shop safety.

13. Instruction materials—

There is an apparent need for shop safety instruction materials dealing with individual and specific machine and tool operations. (A list of pamphlets is now available from the National Safety Council covering most school-shop safety procedures.)

13. Safety in publications—

Authors and publishers of instruction materials should incorporate information on hazards and safe practices wherever it applies. Illustrations should be examined to make sure that only safe practices are shown.

15. Safe installations—

All school-shop installations should conform to the best safety standards and practices.

16. General methods and procedures—

Teachers should be familiar with present practices and procedures of safety education in the secondary-school shop. They should know the strengths and weaknesses of existing policies and conditions.

They should have an understanding of the fundamental needs of a safety program, enabling them to evaluate the numerous proposals that are made from time to time.

The general policy of integration should be continued and extended.

In some instances, however, distinct courses in safety are advantageous.

Safety should be incorporated in step-by-step procedures in the development of work skills.

Tests should be developed to insure an understanding of safe practices in the operation of a particular machine or process.

Liaison with industries, mercantile establishments, etc., should be set up to acquaint teachers with problems and practices.

Students should participate in the safety program of the school and the individual shop. They should be given definite responsibilities and authority.

Either committees or individual students may serve in this capacity but the plan should provide for rotation so all students will participate. ★

News from INDUSTRY

Portable Winch-Hoist

A new Lug-All 1½-ton alloy winch-hoist has a 30-to-1 power ratio and is fully tested to a 100 percent overload. Weight of the hoist is 8½ pounds. Standard features include top-grade preformed flexible aircraft cable, stainless steel fittings and springs, and oiled-for-life bearings. The handle is reversible and acts as a "safety valve" to protect the user. If a rigging must be left overnight, the handle can be removed in 10 seconds, leaving the set-up tamper proof.

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For further information, write the Lug-All Co., 331 East Lancaster Ave., Wynnewood, Pa., mentioning SCHOOL SHOP; *or check no. 59 on the coupon.*

Witherby Woodchuck Chisel

The Winsted Edge Tool Works, Winsted, Conn., has introduced a new pocket chisel for woodworking classes, carpenters, electricians, home handymen, and craftsmen of all kinds. The chisel, with a red handle made of Tenite II plastic, has a blade made of a special analysis crucible steel. Long life and extreme sharpness are two of the main advantages of the Woodchuck. Another advantage is the thin concave tapered blade which maintains the thinness farther up the blade. The Woodchuck is made in ⅜", ½", ¾", 1", 1¼", and 1½" blades. Further information may be secured from the sales agents, John H. Graham & Co., Inc., 105 Duane Street, New York 8, N.Y., mentioning SCHOOL SHOP; *or check no. 60 on the coupon.*

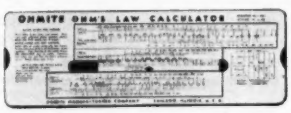
Variable Speed Drill Press

This new Electro-Mechano drill press makes it possible to control the speed of the drill by merely turning a control knob. Moreover, the speed may be adjusted during the actual operation without stopping the motor. A knob below the speed-control dial engages or releases a set of back gears for obtaining very low or high-speed spindle operation. The range is from 150 rpm to 4000 rpm. Model 601 provides instant dependable power at the correct speed with accurate travel and quick-set depth control. All parts are precision ground or machined and compact, totally enclosed design of head means no wasted space in back of column, plus greater safety.

For full information write The Electro-Mechano Co., 261 East Erie St., Milwaukee, Wis., mentioning SCHOOL SHOP; *or check no. 61 on the coupon.*

Vinyl Plastic Ohm's Law Calculator

The Ohmite Manufacturing Company, producers of electrical rheostats, resistors, and tap switches, is now offering a new plastic Ohm's Law Calculator, in a handy pocket size, 3" x 9".



This vinyl plastic calculator provides an easy means of solving resistance problems. All Ohm's Law computing scales are on the front side. On the back are a slide rule, and scales for computing parallel resistance. The slide rule has standard A, B, C, and D scales, and can be used to multiply, divide, and find squares and square roots. These calculators are available in plastic at $1.50 or in varnished cardboard at 25c, through Ohmite jobbers or by writing directly to Ohmite Manufacturing Co., 4937 W. Flournoy St., Chicago 44, Ill., mentioning SCHOOL SHOP; *or check no. 62 on the coupon, enclosing money.*

Tolco School Shop Benches Introduced

The Tolerton Company is introducing a new line of Tolco School Shop Benches which includes ten different models in sizes to accommodate kindergarten, elementary, high school, trade and vocational schools. Styles are offered that provide work and project storage space for one, two, or four students.

The extra heavy hard maple frames are mortised, tenoned, and bolted for extra strength and rigidity. Tops are laminated, edge-grained hard maple, 2¼" thick. For more information write The Tolerton Co., N. Freedom Ave., Alliance, Ohio, mentioning SCHOOL SHOP; *or check no. 63 on the coupon.*

Commercial Plastics Announces Address Change

Commercial Plastics and Supply Corporation has announced the opening of new headquarters at 630 Broadway, New York, N.Y. The firm, a national supply house for Plexiglas, Lucite, Acetate and similar supplies, will have a stockpile of plastic and acrylic material concentrated in 30,000 square feet of stockroom, insuring a maximum of service to customers.

A permanent display of the full range and uses of plastic and associated supplies will be on view, and visitors are invited. Commercial Plastics was formerly located at 55 Prince St. Inquiries should be addressed to the company's new location, mentioning SCHOOL SHOP.

New Literature:

Sealacell Penetrating Process, a new pocket size finishing manual, is now available covering all forms of wood finishing by the Sealacell Process. It contains complete information on wood blonding and other novelty finishes. Sample copies are free on request and student copies are free with orders for materials. Write to the General Finishes Sales & Service Co., 1548 W. Bruce St., Milwaukee 46, Wis., mentioning SCHOOL SHOP; *or check no. 64 on the coupon.*

Appalachian Hardwood Lumber, catalog No. 52, has been published by the Hardwood Corporation of America, Educational Lumber Division, listing Appalachian hardwood lumber for use in industrial arts and vocational education and including detailed descriptions and prices of each lumber type. A catalog may be obtained by writing the Hardwood Corp. of America, Educational Lumber Div., Asheville, N.C., mentioning SCHOOL SHOP; *or by checking no. 65 on the coupon.*

Carter Bandsaw Machine Accessories are described in a new brochure in color of the Carter Products Co., Inc., of Grand Rapids, Mich. Featured are Carter Micro-Precision Guides, "Jiffy" tires, and Carter Rigid Wheels and Quick-Change Demountable Tires. To get your copy, write to the company, Dept. SS; *or check no. 66 on the coupon.*

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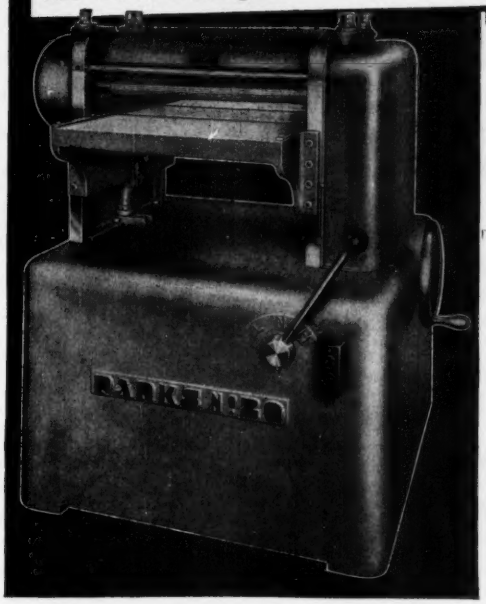

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Directory of Federal and State Officials

This up-to-date list of federal and state officials in vocational and industrial-arts education has been carefully compiled from authoritative sources. Thanks are due all the state directors of vocational education and the U. S. Office of Education for their help in preparing this directory. Keep this directory for ready reference during the year.

U. S. Office of Education Washington, D. C.

Raymond W. Gregory, assistant U. S. commissioner for vocational education.
James W. Kelly, field representative.
Edward G. Ludtke, field representative.
James H. Pearson, field representative.
Silas M. Ransopher, field representative.
Walter F. Shaw, field representative.

State Plans

Ward P. Beard, assistant director.
James T. Gearon, head reports analyst.
Iva G. Prisk, educational statistician.

Program Planning

James R. Coxen, assistant director.

Occupational Information and Guidance Service

Harry L. Jager, chief.
Royce E. Brewster, assistant chief.
Frank L. Sievers, program specialist.
Walter J. Greenleaf, educational and occupational information specialist.

Trade and Industrial Education Service

Walter H. Cooper, chief.
Tom Watson, assistant chief.
Hartman C. Dignowity, program specialist.
Nathan B. Giles, program specialist.
Allen T. Hamilton, research specialist.
W. P. Loomis, program specialist.
Louise Moore, specialist, training for girls and women.

Secondary Education, Instructional Problems Division

John R. Ludington, industrial-arts specialist.

Alabama

R. E. Cammack, director, vocational education, Montgomery 4.
J. C. Cannon, supervisor, agricultural education, Montgomery 4.
J. F. Ingram, supervisor, vocational and industrial education, Montgomery 4.
M. W. Whetstone, state supervisor, trades training, Montgomery 4.
Ben E. Harris, associate supervisor, trades training, University of Alabama, University.
E. R. Plowden, trade and industrial teacher trainer, University of Alabama, University.

Arizona

J. R. Cullison, director, vocational education and supervisor, agricultural education, Phoenix.
Edwin C. Gracey, supervisor, trade and industrial education, and teacher trainer, Phoenix.

Arkansas

J. Marion Adams, director, vocational education, Little Rock.
J. C. Ruppert, supervisor, trade and industrial education, Little Rock.
C. R. Wilkey, supervisor, agricultural education, Little Rock.

California

Wesley P. Smith, director, vocational education, Sacramento 14.
B. J. McMahon, chief, bureau of agricultural education, California Polytechnic School, San Luis Obispo.
Samuel L. Fick, chief, bureau of trade and industrial education, Sacramento 14.
Gail E. Moore, supervisor, trade and industrial teacher training, University of California, Berkeley 4.
Miles Anderson, assistant supervisor in charge of instructional materials, 2129 Grove St., Oakland 12.
Melvin L. Barlow, supervisor, trade and industrial teacher training, University of California, Los Angeles 24.
Lee D. Bodkin, assistant supervisor, trade and industrial teacher training, University of California, Los Angeles 24.
Van B. Lawrence, assistant supervisor, trade and industrial teacher training, University of California, Berkeley 4.
Paul Lofgren, assistant supervisor, trade and industrial teacher training, University of California, Berkeley 4.
G. L. Rosecrans, assistant supervisor in charge of apprentice training, 2129 Grove St., Oakland 12.
Mack Stoker, regional supervisor, bureau of trade and industrial education, Room 809 J, California State Bldg., Los Angeles.
Ernest G. Kramer, assistant state supervisor, bureau of trade and industrial education, Sacramento 14.
Sidney E. McGaw, regional supervisor, bureau of trade and industrial education, 2129 Grove St., Oakland 12.
Horace W. Bates, special supervisor, bureau of trade and industrial education, Room 809 J, California State Bldg., Los Angeles.
Joseph C. Bellenger, special supervisor, bureau of trade and industrial education, 2129 Grove St., Oakland 12.
Leroy A. Blaser, special supervisor, instructional materials program, 2129 Grove St., Oakland 12.
Wallace Theilmann, special supervisor, instructional materials program, University of California, Los Angeles 24.

Colorado

E. C. Comstock, director, vocational education, Denver.
W. G. Flannery, supervisor, trade and industrial education, Denver.
A. R. Bunger, supervisor, agricultural education, Denver.

Connecticut

Emmett O'Brien, director, vocational education, Hartford.
Kenneth H. Lundy, acting consultant, industrial arts, Hartford.
R. L. Hahn, consultant, agricultural education, Hartford.
R. W. Howes, consultant, trade and industrial education, asst. state director, Hartford.
Anna C. Moore, consultant, vocational school and general education, libraries, Hartford.
Urwin Rowntree, consultant, teacher education, Hartford.
Joseph T. Nerden, consultant, audio-visual education, Hartford.

Delaware

R. W. Heim, director, vocational education, University of Delaware, Newark.
A. B. Anderson, assistant director for vocational education and supervisor of trades and industrial education, and teacher trainer, 511 W. Eighth St., Wilmington 43.
Frank M. Forstburg, conference leader trainer in trades and industries, 511 W. Eighth St., Wilmington 43.
W. Lyle Mowlds, supervisor, agricultural education, Dover.
William J. Schott, assistant supervisor, trade and industrial education in charge of teacher training, 511 W. Eighth St., Wilmington 43.

District of Columbia

Lawson J. Cantrell, director, vocational education (white schools), Franklin Administration Building, Washington 5.
F. A. Gregory, director, vocational education, (colored schools), Franklin Administration Building, Washington 5.
Harold A. Clark, head, department of vocational education (white schools), Bell Vocational High School, Washington 11.
E. P. Westmoreland, head, department of vocational education (colored schools), Morse School, Washington 1.
William P. Payne, head, department of manual arts, (colored schools), Morse School, Washington 1.
J. Elmer Zearfoss, head, department of manual arts, (white schools), McKinley High School, Washington 2.
Percy J. Rayford, supervisor, agricultural education, (colored schools), Barrett School, Washington 9.

Florida

Thomas D. Bailey, state superintendent of public instruction and state director of vocational education, Tallahassee.
Harry E. Wood, state supervisor, agricultural education, Tallahassee.
H. F. Hinton, state supervisor, trade and industrial education, and teacher trainer, Tallahassee.
Walter Williams, consultant, industrial arts education, University of Florida, Gainesville.

Georgia

George I. Martin, acting director, vocational education, Atlanta 3.
T. G. Walters, supervisor, agricultural education, Atlanta 3.
W. M. Hicks, acting supervisor, trade and industrial education and distributive education, Atlanta 3.

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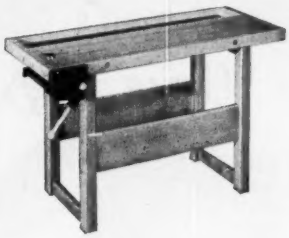

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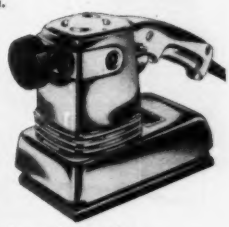

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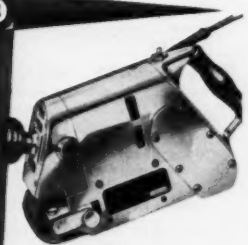

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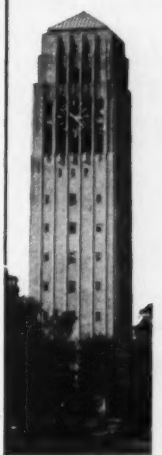

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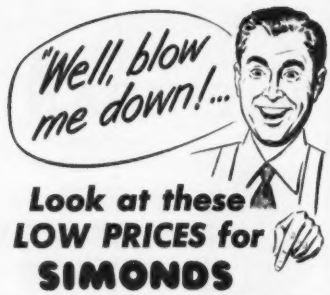

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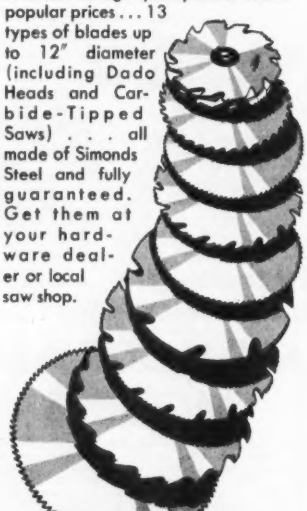

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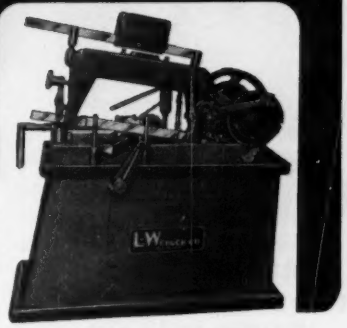

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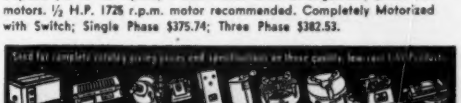

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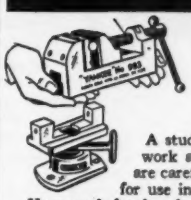

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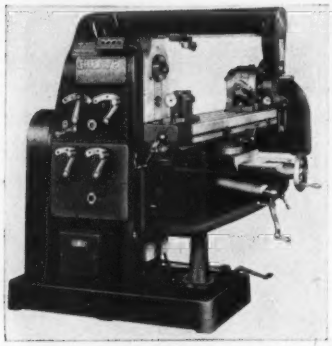

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J. Perry Norris, assistant supervisor, trade and industrial education, 1601 W. 6th St., Stillwater.
Vurl Smith, assistant supervisor, trade and industrial education, 1601 W. 6th St., Stillwater.
Glen Smith, trade and industrial teacher trainer, A and M College, Stillwater.

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Ralph Morgan, supervisor, agricultural education, 105 State Library Building, Salem.
William G. Loomis, supervisor, trade and industrial education, 105 State Library Building, Salem.
Willson C. Lee, assistant supervisor, trade and industrial education, 105 State Library Building, Salem.
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Robert Jacoby, area coordinator, vocational education, University of Pennsylvania, Philadelphia.
Byron Keller, area coordinator, vocational education, University of Pennsylvania, Philadelphia.
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Thomas Pryde, area coordinator, vocational education, University of Pittsburgh, Pittsburgh.
William A. Stephenson, area coordinator, vocational education, University of Pittsburgh, Pittsburgh.
S. Lewis Land, trade and industrial teacher trainer, Pennsylvania State College, State College.
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Ferdinand Rossy, supervisor, industrial arts, San Juan.
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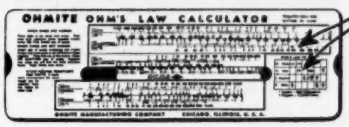

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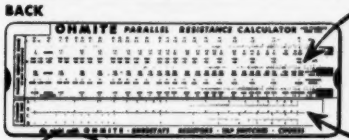

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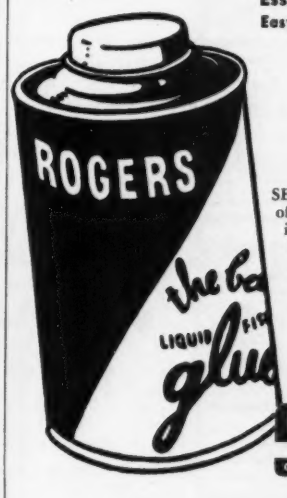

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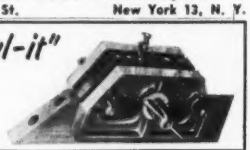

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Washington . . . . *from page 96*

Vocational Programs Criticized.—Public vocational schools get their share of criticism on the misuse of supplies. About $500 million has been spent on supplies for veterans since 1944. Mr. Teague says that too many public vocational schools exceeded the bounds of "normal prudence" in using federal funds to give veterans free books, slide rules, manuals, tools—especially tools. Mr. Teague says that public and private, profit and nonprofit schools, found in the supply program a windfall through which they maintained overflowing tool cribs, large amounts of hand tools, and opportunities to carry out pet projects which they could not have afforded without a subsidy from this source.

Another abuse is that veterans have pawned millions of dollars worth of tools issued by VA. In Baltimore, 95 percent of all pawned tools had been furnished veterans by trade and vocational schools. In nearly every major city, Hock Shop Row is filled with veterans' tools.

Korean Veteran Outlook.—Mr. Teague can do very little about abuses in the past. He wants to make certain that they do not occur in the future. His immediate concern is how to provide Korean veterans with vocational training that is honest, economical, and fair to the veteran.

He has introduced a bill to carry out his ideas. Here is what the bill would do:

1. Limit entitlement to education and training to a 36-month maximum, with a day and a half of schooling allowed for each day of service.

2. Allow veterans one change of course within two years, and only one additional change thereafter.

3. Provide single monthly lump-sum payment for tuition, subsistence, and supplies to all veterans enrolled in more than half-time courses, subject to satisfactory progress and attendance. The allowance would go directly to the veteran.

Value of allowances would be about as they are today. However, the total tuition for a one-year full-time course will be held down to $270 compared with the $500 maximum allowed World War II veterans.

The Teague bill further would require VA to pay expenses of state approval agencies; limit VA authority to approve courses; continue present avocational and recreational training ban.

The Moral and the Spiritual in the Shop.—Can the lathe sing a song of man's spiritual longing? Can the shop bench inspire moral values? Washington educators believe so. Their belief stems from a deep concern with moral and spiritual values and from their conviction that every school activity can help pupils develop moral and spiritual values.

The Educational Policies Commission and an American Council on Education committee on moral values agree on four points: that no special courses in moral values are needed in a school; that all teachers in all subjects should be sensitive to these values; that all teachers should emphasize them; that developing these values is not a question of doing something *to* and *for* children but *with* children.

As for industrial arts, they offer ample opportunities for imbuing children with the good, beautiful, and true, suggests Dr. Clarence Linton, head of the American Council moral-values study. In the shop, teachers may encourage pupils to finish what they have begun, bolster personal integrity through a job well done, develop respect for property and tools, give outlet to creative ability, emphasize the need for work, bring out satisfaction in personal achievement.

Veteran Report.—Hale and hearty

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J. C. Wright, former Assistant Commissioner for Vocational Education, is busy in the U. S. State Department, working on the Point-Four Program of technical cooperation. His official title is Consultant for Vocational Program Planning. His official berth is with the Institute of InterAmerican Affairs.

L. H. Dennis, former AVA executive secretary, is now chief officer of the Alpha Zeta fraternity, an honorary group for agricultural educators. He also serves as consultant for vocational education and takes special delight in lecturing, teaching, and writing.

Oil for the Lamps of Learning.—The oil that lies offshore our coastal states has intrigued educators and Congressmen alike. They believe that income from this national wealth could and should be used to help pay for public education. Senator Hill, whose enthusiasm for this idea inspires him to glowing terms ("oil for the lamps of learning"), wrote a bill to give schools and colleges part of the revenue from tidelands oil. Educators are rallying behind Senator Hill. Among them is AVA Executive Secretary M. D. Mobley, who endorsed Senator Hill's idea. In a statement before the Hill subcommittee, Mr. Mobley pointed out that vocational educators are interested not only in using the oil revenue for vocational education but for elementary and secondary education as well.

No one believes the tidelands oil bill will pay off in the immediate future. The states claim that the U.S. government has no right to the wealth that lies off their shores. Catholic leaders demand that parochial schools must receive a share of the oil money—a view sharply protested by many. These controversies spell trouble for Senator Hill's bill. Like federal aid to education, the tidelands oil proposal may always be a bill, never a law. ★

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By MICHAEL PACA

Perky Committee at Work.—Seven men have been trudging through the halls of the U.S. Office of Education, Vocational Education Division, interviewing staff members; reviewing charts and reports; closeting themselves now with U.S. Commissioner of Education McGrath, now with Assistant Commissioner for Vocational Education Gregory.

The seven constitute the Perky Committee, who have been asked by Commissioner McGrath to look into the inner workings of the Vocational Division and report to him how things can be improved.

If you have missed the names of the seven they are: J. B. Perky, Executive Officer for Vocational Education, Oklahoma; Harry C. Schmid, State Director of Vocational Education, Minnesota, and President of the American Vocational Association; H. G. Halstead, State Director of Vocational Education, Washington; J. Marion Adams, State Director of Vocational Education, Arkansas; H. C. Fetterolf, Chief, Agricultural Education, Pennsylvania; Inez Wallace, State Supervisor of Home Economics, Georgia; and Alexander Brin, member of the Massachusetts Board of Education.

The so-called Hardy report is always before or near the seven. This document, by a House Subcommittee on Government Operations, contains charges of inefficiency and malpractice against the Vocational Division. It provides the committee of seven with a guide for recommending improvements. No one is saying anything about the direction in which the study is moving—except this: Mr. McGrath expects the Perky Committee to report to him not later than March 5. If he likes their ideas, he will ask Assistant Commissioner Gregory to put them into effect.

"There will be a big story on this next month," Mr. McGrath said, as this issue went to press.

GI Bill Dirge.—Everything wrong with GI education is summed up in this story by Rep. Teague, a Democrat from Texas.

A veteran got a job on a sheep ranch and enrolled in institutional on-farm training. After two years in a livestock-raising class, he switched to a private trade school. The regional VA office approved this change although its officials realized that $2000 paid for tuition, books, supplies, and subsistence while on-farm training did not help the veteran toward readjustment. After a few months in the trade school, the veteran turned up in a junior-college writing course. Throughout his dealings with the VA the veteran wrote long letters, mostly about his subsistence allowances, how much he was entitled to, why his checks were late, how desperately he needed money, how happy he was when his checks came regularly. He will soon exhaust his entitlement at an expenditure of $7000, largely a waste of his effort and of government money.

In this story are all the villains of the GI education piece, in order of the gravity of their guilt: the conniving veteran, the dishonest private trade school, the loosely run on-farm training, the indulgent VA.

The public vocational school is not in the list. It is outside Rep. Teague's chamber of horrors. In fact, public vocational schools get a clean bill of health—almost—from the Teague Committee's investigation-in-depth of GI education.

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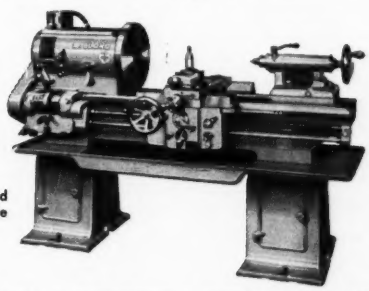

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